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TELEPHONE ENGINEER

MANAGEMENT • ENGINEERING • MAINTENANCE

The National Telephone Journal

Spring CONSTRUCTION NUMBER

★

APRIL 15, 1941

Improved Specification

For more than 25 years, Acorn Insulated Wire Company has pioneered in the improvement of telephone wires. With its finer mica-finished drop wire; its plastic-insulated jumper wire; its shielded buried wire; Acorn has established standards which have benefited the entire industry. Now, by abandoning the old-style paper-wrapping of coils, Acorn again breaks with tradition. Today, all standard Acorn wires are packaged in protective moisture-resistant cartons — a new, superior packing for superior products.

The following advantages of the new cartons will instantly appeal to practical telephone men. (1) The correct size of coil "eye" is always maintained by the rigidity of the carton; coils cannot be "squashed" to a degree that they will not fit standard reels as with paper-wrapping. (2) Unused portions of coils can be re-inserted in cartons and kept until needed. This is particularly important with interior wires as it keeps braid clean and avoids damage to wire. (3) Stocking and warehousing are simplified. The cartons stack neatly and wires can be readily identified. There are no mutilated tags to decipher. Each carton is clearly labeled.

Listed below are some of the Acorn specification wires—in the new cartons —which are available for immediate shipment from Leich Sales Corporation, 427 W. Randolph Street, Chicago.

No. 22 Ga. Brown Braid Interior Wire

No. 22 Ga. Plastic Jumper Wire

No. 17 Ga. Bronze Drop Wire

No. 19 Ga. Green Braid Inside Wire

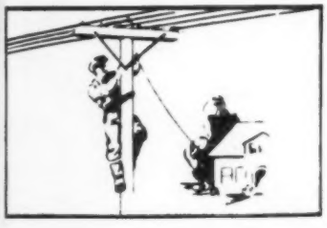
No. 20 Ga. Black Braid Bridle Wire

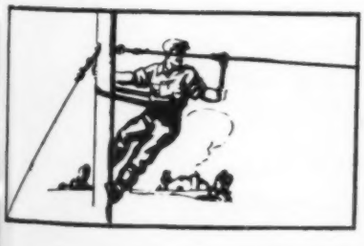
LEICH SALES CORPORATION

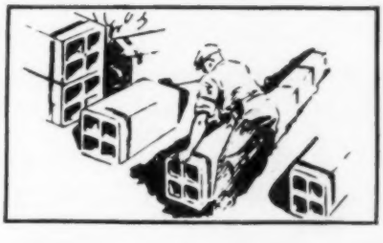
427 WEST RANDOLPH STREET • CHICAGO, ILLINOIS

COAST TO COAST

BORDER TO BORDER







WHEN YOU BUY LINE SUPPLIES . . .

It's nice to deal with a company that you can DEPEND ON. It's good to know that your orders will be shipped promptly, when and where you want them. Send your orders to Kellogg and know that you're getting the highest quality, pre-tested, DOUBLY GUARANTEED materials at fair prices.

KELLOGG SWITCHBOARD & SUPPLY CO., CHICAGO

We are presenting herewith the LARGEST Spring Construction Number we have ever printed. The many letters received from readers after we announced this issue assisted us greatly in the selection of subjects presented. To you, our readers, we dedicate this number. To our advertisers we "Thank You" for assisting materially in our presenting the industry an issue that should be of material aid at a time when it is most needed.

The Wire Chief's Training Course which was started March 15 has proven one of the most popular features we have ever presented. Personally, the Editor's mail is getting a bit bulky. But, we have just been notified that "that ain't nothin' yet", as the boys in service with the Signal Corps have heard of this course and the deluge has just started. The entire plan is outlined on page 34 for those of you coming in after the show began.

The Editor would like to here and now publicly praise our new Technical Editor B. C. Burden from a personal viewpoint. Since assuming his position he has made our job easier and much more effective. From the letters received from operating telephone men and their employees we feel the change has made a much better TELEPHONE ENGINEER and presented many more opportunities to improve our magazine along the lines started by our Dad many years ago.

TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

Vol 45, No. 4 APRIL, 1941

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EDITORIAL

The Magazine Show Window

ONE OF the best posted telephone operating men we know wandered into the TELEPHONE ENGINEER exhibit room at the national convention last October, along in the shank of the evening, and for thirty minutes gave us an interesting dissertation on the many recent improvements in the art of telephony from the standpoint of equipment, plant, and construction and maintenance methods.

"Just how," we asked this gentlemen, being greatly impressed with his profound knowledge of all the new things in telephony, "do you keep yourself so up to date on these telephone affairs?"

"You should be pleased when I tell you," he replied. "The answer is—I read all the advertisements in the trade magazines."

"I also go further than that," he added. "I require all the principal people in my organization to read them, too."

"You see," he explained, "I know that just as soon as a manufacturer has developed some new device to the point where he considers it commercial, he advertises it. His reason for developing it is to sell it. The way to sell it is, of course, to let telephone people know about it. The way to do that is to advertise it in the telephone trade paper."

"Now, I figure that we are living in a world of such rapid progress that no man in any business can afford to take the chance of not knowing the improvements that are going on, technically and otherwise, in his business. The fellow who manages a business successfully these days has got to know about the changes and improvements in it."

"He learns many things about his business by reading the articles in the trade magazines. But he also learns many important things by reading the advertisements. I know of more than one case where the manager of a telephone company who has failed to scrutinize the advertising carefully, is trying to run his business without the aid of equipment, tools or something of the kind that would save him a lot of money and trouble. I don't intend to be that kind of manager."

SINCE this gentleman is the head man of one of the most successful Independent telephone companies in the country, he must know what he is talking about.

Advertising costs the advertiser money. He does not spend this money just because he loves the publisher. He spends it because it is his firm conviction that the things he has to advertise are worth the attention and consideration of every management and individual in the field of business he supplies.

We do not think it is going too far to say that a knowledge of what is being advertised in any given field of business is essential to successful and up to date management of a business in that field.

Advertisements in trade magazines are the show windows of the advertisers. You can do your shopping in an easy chair! Read your trade paper advertisements. Keep yourself alive to what is going on in the industry of which you are a part!

If you want any further information from the advertiser, don't hesitate to write him. He is always glad to answer inquiries. You can obtain a wealth of information about the telephone business by simply telling the advertisers—or the publisher of your trade paper—what it is you want to know.

Make the advertisements in your trade paper work for you! They will do that if you read them, because they'll always keep you abreast of the improvements in telephony that are available to you.

Fig. 1 — Good construction is cheapest in the long run.

Rehabilitation of the Run Down Plant

By B. C. BURDEN
Engineer, Lincoln Telephone & Telegraph Company

General

SPRING is the season when a young man's fancy turns to thoughts of love, etc., etc., but for the wide-awake telephone man it is the time for planning a comprehensive plant rehabilitation program.

For those Companies that have kept their plants in good condition, a spring and summer plant overhaul program is a relatively simple matter and involves mainly the repairing of the wear and tear that the plant has received at the hands of old man winter. There are many Companies, however, that have put off much needed repairs for a number of years and to these Companies the arrival of spring offers an opportunity to **do it now** before service sinks to a new low.

The important part that telephones throughout the Nation will play in National Defense should be an added incentive to every telephone man to do everything possible to make needed repairs so that reliable service can be rendered.

This article discusses the general features of the repair of outside plant.

Fig. 4 — Well designed light construction trucks indispensable for efficient plant repair operations.

The Survey

BEFORE any overhaul or repair work is started a survey of the plant should be made to determine the answer to the following questions:

1. What is the total amount of repair work necessary?
2. What work should be done first?
3. What materials will be required?

The survey need not be elaborate or time consuming as any good telephone man should be able to determine approximately how much work should be done by driving over the plant and without the necessity of a pole to pole inspection. This is particularly true of the smaller companies where the manager does the inspection work and his judgment is final. Whether or not the inspection should embrace the entire plant, or merely "high spot" sections known to be in immediate need of repair, will of course depend on the amount of work that can be financed during the construction season. A complete survey of repairs needed should be made if time permits as the information gained will be useful even though it is not feasible to make all the necessary repairs during the current construction season.

The inspection procedure consists in driving over the various open wire and cable leads and making notes on any repair work needed. By using city and rural maps in conjunction with detail

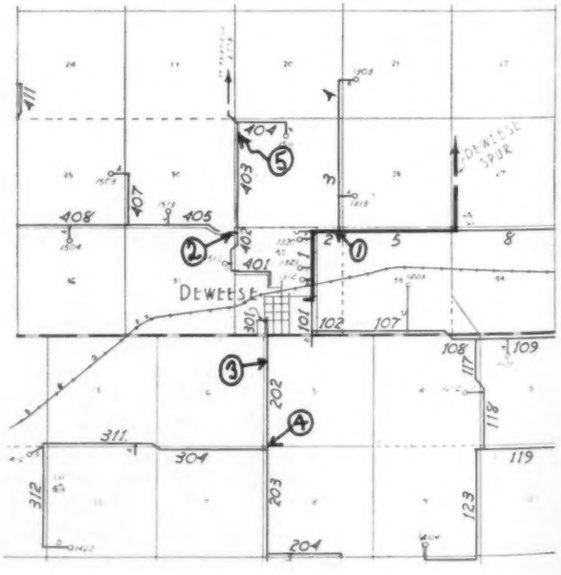


Fig. 2—Use of maps and detail sheets for recording results of Plant survey.

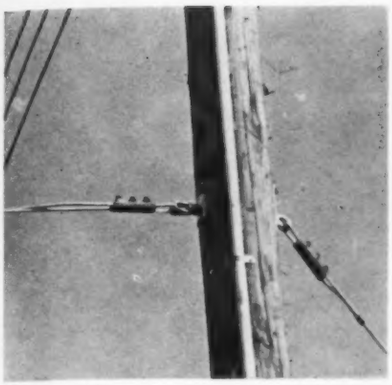


Fig. 3—Miscellaneous features of good construction. Top: Use thimble eye bolts for guys. Center: Protect drops through trees with loom. Bottom: Use adequate lead on guys.

sheets a good record will be obtained which can easily be reduced to material requirements in the office. Figure 2 illustrates how the detailed notes are tied to the map by reference numbers.

Conditions Requiring Correction

THE inspector should carefully observe the plant for conditions such as the following:

A—Rotted or shattered poles
B—Poles requiring straightening
C—Rotted cross arms and broken pins
D—Excessive sag in cable or open wire
E—Inadequate clearance over roadways
F—Missing cable rings or sleeve supports
G—Strain on cable leg
H—Rusty open wire that will need replacement
I—Loose ties or missing tie wires
J—Broken or loose glass
K—Objectionable tree conditions
L—Bad aerial cable sheath condition
M—Drop wire runs in poor conditions
N—Broken or loose guys
O—Rusty Line wire
P—Loose brackets
Q—Poor corner pole construction

In order to save time in recording the results of the inspection, the letter code given above can be used, for example, assume that at a location which is identified on the map as location No. 17 that objectionable tree conditions exist and that the drop wire should be replaced. This can be written up in the detail sheets as follows:

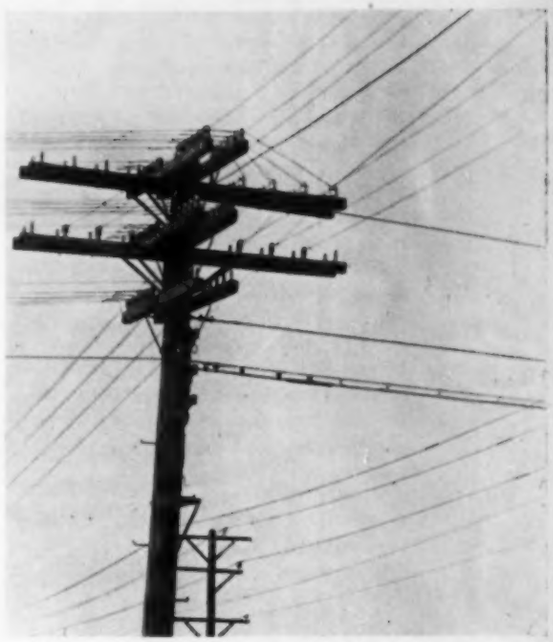


Fig. 6 — Well built junction pole.

Detail No.	Condition	Time Est.	Material Required	Comment
17	K & M	2 men—6 hrs.	600 feet drop wire	Do not defer

If it is desirable that work be done promptly and not deferred, this should also be shown.

Ordering Material

WHEN the survey is complete the information gathered should be summarized in the office to determine the total amount of work and material required. Cost figures should be applied and if the total costs exceed the funds available for repair purposes, then that portion of the work that can be deferred should be removed from the proposed construction program.

In ordering material do not overlook the smaller items that are so essential to good construction work as for example, galvanized lag screws, cross arm bolts, splicing sleeves, test connectors, etc. Figure 3 shows several features of construction that are important. **By all means order standard telephone construction materials from telephone supply houses and do not attempt to use "hardware store" materials which will generally prove short lived and unsatisfactory.** (See advertisements in TELEPHONE ENGINEER.

Adequate Tools Needed

AT THE same time the necessary construction materials are ordered it would be wise to check over the tools on hand to insure they are adequate

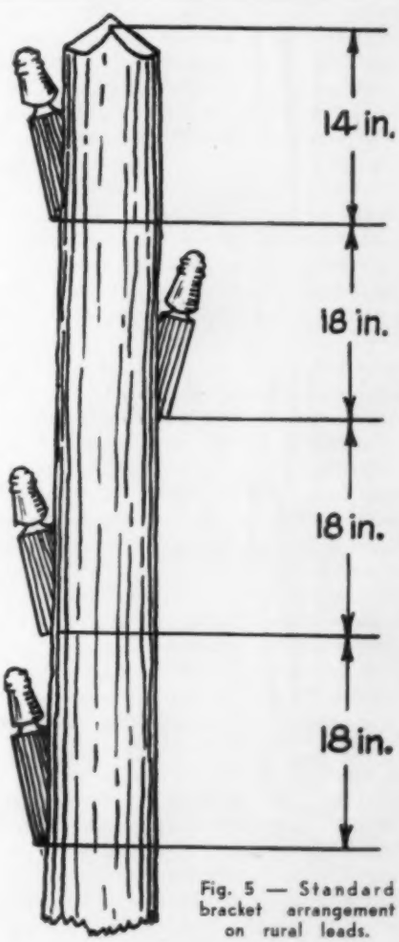


Fig. 5 — Standard bracket arrangement on rural leads.

for the construction work to be undertaken. Companies that have not yet adopted the compression sleeve method of line wire splicing should consider the adoption of this new and approved method. Inventory the tools on hand, then check over the list of tools shown in your telephone supply house catalog. You will probably find there are a number of tools needed, and as has often been said "Good tools are always a worthwhile investment."

Figure 4 shows a modern well designed construction truck. It is not hard to "prove in" a well designed telephone truck as substantial savings result from the greater dispatch with which work can be carried on, and the lesser breakage and loss of material carried.

Truck bodies are available for both small and large companies at very reasonable prices.

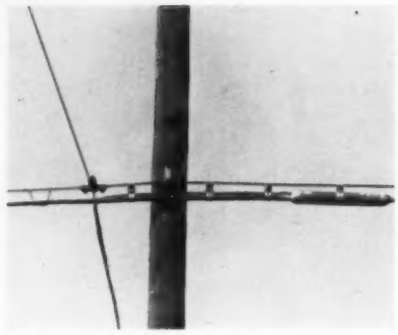
Pole Line Overhaul

IN WORKING on City plant it is usually a good plan to first get the pole line in shape and then make the necessary repairs to cable and open wire. Poles that are rotted off should be reset if the timber above the ground line is good and if the pole when reset will give adequate ground clearance for the wires or cable carried.

Important junction or cable terminal poles can often be advantageously stubbed rather than replaced or lowered. The choice of stubbing vs. replacement will depend on the amount of work involved in transferring to a new pole. If the pole is to be stubbed, regular stubbing bands should be used in preference to the old fashioned wire wrap method. Poles that have been pulled out of line with the lead should be straightened as this is a simple operation and a pole badly out of line affects the appearance of the lead.

When it is necessary to replace a pole and the new pole is to be set in the same location as the old pole, the following procedure should be followed: Cut off the old pole at the ground line and set to one side. Dig out the rotted butt **being sure to** clean out all decayed material from the hole. Set the new pole and transfer the wires or cable from the old to the new pole being sure to work from the new pole. If a pole jack is available time can be saved by raising the pole about one foot before sawing it off at the butt. The upper part of the pole is then set to one side while the butt is raised from the hole with the pole jack. This reduces the amount of digging required.

Where a slight shift in pole location is not objectionable an old pole can be reset by digging a new hole close to the old one and then cutting off the old pole close to the ground line and setting it in the new hole after which



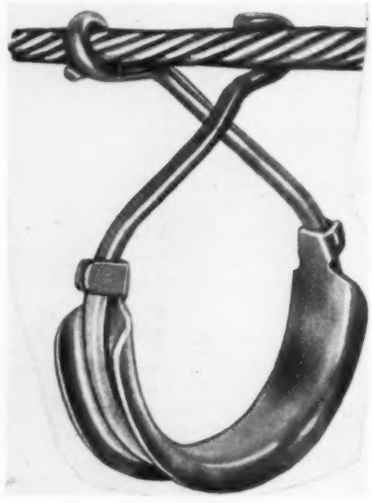


Fig. 7—Special cable supports.

the wires or cable can be adjusted for the new location and the hole back filled and thoroughly tamped.

Miscellaneous Pole Work

Where the top of a pole has been badly shattered by lightning, or has decayed, the attachments should be lowered and the pole top cut off and reroofed. Do not reduce clearance of wires or cable above roadways below legal minimum (18 feet in most states).

Broken or rotted brackets should be replaced and an effort should be made to keep bracket leads uniform in appearance by following a fixed plan for bracket position on the pole. Figure 5 illustrates standard bracket arrangement. Cross arms that are rotted sufficiently to permit pins to become loose should be replaced particularly on corner or dead end junction poles. In many cases the cross arms will be satisfactory but pins will require replacing. In putting in new pins be sure to nail the pin in place using a 6 d galvanized nail. Loose crossarm braces and through bolts should be tightened.

Old style junction poles should be rebuilt so as to remove a fertile source of poor transmission, lightning burnouts, etc. A good type of junction pole for an open wire lead where a two pole corner is not practical is shown in Figure 6. If possible a two pole corner should be used.

Defective or inadequate guys should be replaced and guys located in positions where pedestrians might stumble against them should be equipped with a good guy guard.

Overhauling the Cable Plant

CABLE is one item of outside plant that will suffer real damage where needed maintenance is deferred. Unlike poles and open wire, the cable plant cannot readily be restored to its original efficiency and condition by a little minor repair work. To avoid costly replacement of aerial cable periodic inspection should be made to reveal potential sources of trouble and these should then be promptly removed. The chief sources of trouble on aerial cable are bad tree conditions, excessive sag, missing rings and lack of proper support for sleeves, faulty construction at cable terminal poles, lack of proper protection at junction of open wire and cable, etc.

Excessive sag is one common source of sheath damage as the cable tends to creep to the middle of the span and the resulting tension at the poles results in breaks and severe ring cutting. Likewise a greater latitude of movement during storm conditions results and consequent shifting of the sheath in the rings accounts for considerable damage. A good telephone man can generally determine by inspection whether or not a cable has excessive sag. Table 1 shows what is considered a standard amount of sag for the average spacing of city poles and at a temperature of 60° F.

Table No. 1—Sag of Messenger with Cable in Place for 110 foot spans at 60°

Size	Sag in Inches
25 - 24	8″
50 - 24	11″
100 - 24	14″
200 - 24	20″
25 - 22	11″
50 - 22	12″
100 - 22	17″
150 - 22	20″

Cable Supports

WITH THE excellent design of the modern ring, it is seldom that rings are out of place or missing, however, some of the older types of rings had a tendency to creep on the messenger leaving sections of cable several feet in length unsupported resulting in crystallization and ring cutting. All missing rings should be replaced and in placing new rings the rings should be placed approximately 20 inches apart. If inspection reveals that ring cutting is prevalent yet sag and other conditions are normal, the rings may be at fault. Cable rings have been greatly im-

(Please turn to page 50)

Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by
ROLAND C. DAVIES
Editor, Telecommunications Reports

Telegraph Merger Hearings

TWO years before the Senate, the long-standing issue of the telegraph merger through enactment of permissive legislation to allow the domestic and international carriers to consolidate is to be the subject of a Congressional hearing on May 5 before a subcommittee of the Senate Interstate Commerce Committee. The hearings take place under the Senate resolution, sponsored by Chairman Wheeler of the Senate Interstate Commerce Committee, which calls for an investigation of the telegraph industry, particularly with regard to the merger aspects.

The FCC in the past two years has advocated strenuously the consolidation of Western Union and Postal Telegraph through Congressional enactment of a law permitting these domestic wire telegraph carriers to merge just as is allowed in the telephone field. In addition, the FCC has advocated similar legislative approval for the consolidation of the international cable and radio telegraph companies. However, the staging of the May 5 hearings by the Senate Interstate Commerce subcommittee does not mean that Senator Wheeler has given a green light to the merger proposals but the Montanan is understood to be solely desirous of completing the telegraph industry inquiry at this session because it has been pending in Congress for the past two years.

FOR THE Telephone industry, the merger proposals in the domestic field present important implications, because in the projected combination of Western Union and Postal Telegraph the FCC has recommended that the teletypewriter exchange service of the American Telephone and Telegraph Co. and Bell System should be withdrawn from the telephone industry and placed under the "roof" of the merged telegraph company. The FCC's recommendations for the transfer of the TWX service to the telegraph merged concern do not specify the terms or the operating difficulties and procedure in such an event. Not only is this plan a matter which would need much more clarification and proof of necessity to gain the acquiescence of the A. T. & T. which developed this service about a decade ago with notable results in public support and use, but also it is a step which is of great concern to the A. T. & T. and Bell System employees engaged in the TWX operations. The National Federation of Telephone Workers has already opposed such a move in statements to Senator Wheeler's committee and would undoubtedly vigorously fight the plan in the hearings commencing May 5.

Signal Corps

WITH THE war clouds drawing closer to the United States, the Defense Communications Board planning is becoming extremely significant for the telephone industry, although so far the DCB has not divulged any of its communications industry recommendations to be put into effect in event of American participation in the world-wide military conflict. The DCB transmits its recommendations to President Roosevelt who promulgates them in executive orders.

The DCB Telephone Committee which is engaged in presenting reports and studies from the industry to the Board held a most important session in Washington during early April. Major General Joseph O. Mauborgne, Chief Signal Officer of the Army and the Army's DCB member, together with the Board's Coordinating Committee, met with the Telephone Committee to outline the Army's needs for telephone service. It was the first time that a Board member conferred with one of the technical committees. This session which was presided over by Z. Z. Hugus, A. T. & T. Assistant Vice President was attended by Louis Pitcher, Executive Vice President, and Clyde Bailey, Washington Representative, of the United States Independent Telephone Association.

28-Day Training Course

ANOTHER defense development of recent interest to the telephone industry was the announcement by the Signal Corps that Reserve Field Officers with ranks of Colonel, Lieutenant Colonel and Major are to be given training periods of 28 days duration to gain additional command and staff experience. It was contemplated that 50 Colonels, 200 Lieutenant Colonels and 250 Majors were to undergo this training. At the same time, the Signal Corps announced the establishment of new buildings to cost nearly $1,000,000 which will mean 101 communications schools in every Army Corps, Division and Antiaircraft firing center or camp. These buildings for the 101 communications schools will be used to train communications specialists entering the Army under the Selective Service.

Another defense move, which was of a civilian defense character, was a plan for fire defense, formulated by a committee representing the leading municipal fire department authorities of the country. This report which was presented to the Office for Emergency Management stressed communications as the nerve structure of fire defense and protection and recommended each community fire officials survey the telephone facilities and catalogue the technical telephone personnel for use in any defense emergencies. The private telephone systems of cities and towns were characterized as most important auxiliary units for fire communications to supplement the regular fire department facilties.

(Turn page please)

The Plaintiff—Telephone Pole

In a recent issue of the Bulletin issued from the offices of Leslie Gritten, secretary-treasurer of the Oregon Independent Telephone Association, we noticed the following excerpt from the Portland Oregonian:

"Clifford Parsons, 33, Portland, got quite a bump when an automobile he was driving crashed into a TELEPHONE POLE at N. E. 33rd Ave., Wednesday, but he experienced a more violent jolt Friday. He was arrested on warrants charging him with failure to leave name and address at scene of an accident and failure to report the mishap. 'He could have tacked his name on the pole' a court attache commented as the warrant was issued."

USITA Executives Conference at Chicago

DONALD McGIBNEY

THE annual Spring Conference of executives of Independent telephone companies will be held April 29 and 30 at the Stevens Hotel, Chicago. We are reproducing herewith the Official Program. This Conference has enjoyed a growing attendance each year and the coming one is expected to eclipse all previous attendance records.

Association executive vice president Louis Pitcher has announced that the Conference would also hear Donald McGibeny, well known news commentator, speak on a subject outside the industry. Mr. McGibeny served in both British and U. S. Intelligence during World War I and since has served as foreign correspondent for newspapers and Press Associations. He has been in radio since 1933 and joined NBC the following year. His address "This Crazy World" should be very interesting.

Hotel reservations should be made at once. The meeting is purely a business meeting with no trade exhibits and restricted to member companies of the United States Independent Telephone Association. There will be no entertainment.

Program

TUESDAY—APRIL 29

10:00 A.M. REGISTRATION—Tower Room, 28th Floor

1.30 P.M. OPENING OF CONFERENCE—Tower Room, 29th Floor
REPORT OF PRESIDENT AND NATIONAL DEFENSE COORDINATING COMMITTEE—by Carl D. Brorein, President, and Chairman Defense Committee
DISCUSSION
WASHINGTON ACTIVITIES—by Clyde S. Bailey, Washington representative
"THIS CRAZY WORLD"—by Donald McGibeny, Radio News Commentator

6:30 P.M. Directors' Meeting and Dinner—WEST BALL ROOM

WEDNESDAY, APRIL 30

9:30 A.M. Tower Room—29th Floor
COMMERCIAL CONFERENCE—J. T. Carliss, Chairman
Discussion
PLANT CONFERENCE—F. E. Behm, Chairman
Discussion
DEPRECIATION COMMITTEE REPORT—E. C. Blomeyer, Chairman
Discussion

1:30 P.M. Tower Room—29th Floor
ACCOUNTING CONFERENCE—C. E. Archer, Chairman
Discussion
REPORT WAGE-HOUR COMMITTEE — J. H. Agee, Chairman
Discussion
REPORT TOLL COMPENSATION COMMITTEE — E. M. Blakeslee, Chairman
Discussion
ADJOURNMENT

For the operating telephone companies, the OPM's issuance of civilian industry classifications in regard to the rationing of aluminum and zinc during the latter part of March was most interesting because the OPM and defense authorities indicated their viewpoint that the civilian or normal plant and equipment needs of the telephone industry might well be placed in the same nich of imperativeness as the communications equipment necessities of the Army and Navy. In fact, the civilian rationing of aluminum placed the telephone industry normal needs in a rating just below the priority classification for similar Army and Navy equipment.

FCC Reorganization?

THE IDEA of a reorganization of the FCC, together with a Congressional inquiry into its functioning, has again bobbed up on the Senate side of the Capitol. The reorganization-investigation of the FCC is being agitated by the broadcasting industry which has been especially aroused by the recent Commission moves against radio networks, newspaper ownership of broadcast stations and opposition to clear channel stations.

One of the leading broadcasters recently conferred with President Roosevelt and the inkling was given after his White House visit that the President might be agreeable to a move to revamp the FCC. In the Senate it was reported that Senator White of Maine, ranking Republican on the Senate Interstate Commerce Committee and leading Congressional authority on communications, was ready to join with Chairman Wheeler in a bill to reorganize the FCC from its present 7-man setup to a three member agency in which the Chairman would be the administrative head and one member would handle common carrier communications and the other broadcasting. However, Senator White has not yet introduced such a measure and even if he did it would face a rocky road in achieving final Congressional enactment.

Of more importance, because of the probable certainty of enactment, was the recent approval by the House Judiciary Committee of a bill to permit the Federal Bureau of Investigation under specific authorizations by the Attorney General to intercept and record telephone, telegraph or radio messages and communications. The House Committee bill instructed the Attorney to indicate definitely in each FBI authorization for wire-tapping the grounds for its justification. At the same time Senator Wheeler introduced a bill to strengthen Section 605 of the Communications Act so as to prevent any private wire-tapping even though it was not divulged or published.

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THE NEW CABLE SPINNER

By RAY SMITH

Fig. 2—The new Cable Spinner

General

A NEW METHOD and machine for suspending aerial cable from supporting strand has recently been made commercially available to telephone companies. This method consists essentially of lashing the cable to the messenger with a .091 gauge (slightly smaller than No. 12-B.W.G. iron) soft iron galvanized coated wire. The process whereby the cable is fastened snugly against the messenger is known as "spinning" and is accomplished by a machine known as a **Cable Spinner** which wraps the lashing wire spirally around cable and messenger, as shown in Figure 1. The wraps are about 13 inches apart. This method of suspending aerial cables has been under development for a number of years and has been given extensive field trials by the Southwestern Bell Telephone Company. It is only recently, however, that a suitable cable spinner has been made available and it is safe to say that the new method may now be considered as good construction practice.

As to what extent the cable spinning method will replace or supplement the ring suspension method, the writer would hesitate to say. Each system has its advantages and disadvantages, however it is certain that the new method is here to stay. A machine in place on the messenger and ready for the spinning operation is shown in Figure 2.

Advantages of Spinner Method

MOST new developments are prompted by some objectionable condition which needs correction. In the case of the new method of cable suspension, the condition was sheath damage due to ring cutting and vibration. Some of the early types of cable rings were so made as to result in excessive damage to the cable sheath supported. The cable ring manufacturers have done a splendid job of overcoming short comings of the early rings and the modern rings together with the special saddle supports for use at poles and on heavy sleeves have largely overcome the difficulties encountered with the early type rings.

The cable spinning method is thought to eliminate the possibility of sheath damage by the more frequent supports plus the reduced tendency for creeping and bowing. The fact that the cable and messenger become an integral unit greatly reduces the tendency of the cable to vibrate which is a prime cause of crystallization and ring cutting.

THE well designed cable spinner unit shown in Figure 2 is constructed of strong but light weight aluminum alloys so as to make it easy to handle. The essential parts are:

1. The rotating head which spirally wraps the .091 lashing wire around cable and messenger and which is provided with a gate which permits the head to be placed over cable and messenger.
2. A gear mechanism which is driven by a crank and which propels the machine along the messenger and at the same time rotates the spinner head and wire reel. (Reel holds 350 feet of wire).
3. An adjustable roller which extends in front of the spinner head and which holds the cable tightly against the bottom of the messenger.
4. The supporting framework and the seat in which the operator rides.

The cable raising arm is provided with an adjustment which permits regulation

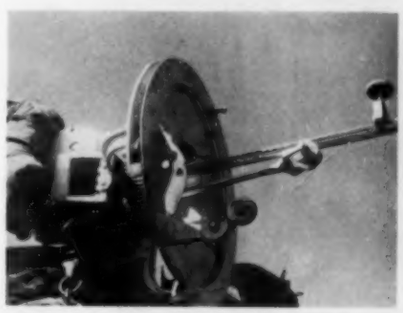

Fig. 5 — View showing cable raising arm which presses cable firmly against messenger.

Fig. 1 — Section of Cable Suspended by new method.

Fig. 3 — Cable in place ready for the Spinning operation and lineman just getting into seat.

Fig. 6 — Spinner in operation between poles. (Note — The operator needs only turn crank to both propel machine and operate the lashing wire spinner)

Fig. 8 — Method of transferring machine by pole (One man can handle machine).

of the pressure applied to the cable and thus takes into account the difference in diameter of the various size cables. Several rollers are also available to accomodate the different sizes of cable. The amount of tension applied to the wire as it wraps around the cable and messenger is controlled by means of tension rollers.

Use of the Spinner

PRELIMINARY to the actual spinning operation, the cable must be placed and suspended from the messenger. This is accomplished by pulling out the cable in the usual manner but with the rings spaced at 10 - 12 foot intervals rather than the usual 20 inches, and as shown in Figure 3. After the cable is in place it should be placed under moderate tension using grade clamps to anchor one end while the other end is held under tension by means of blocks and a cable grip. **This is an important operation and should not be neglected** as it reduces the possibility of subsequent bowing or buckling at the poles.

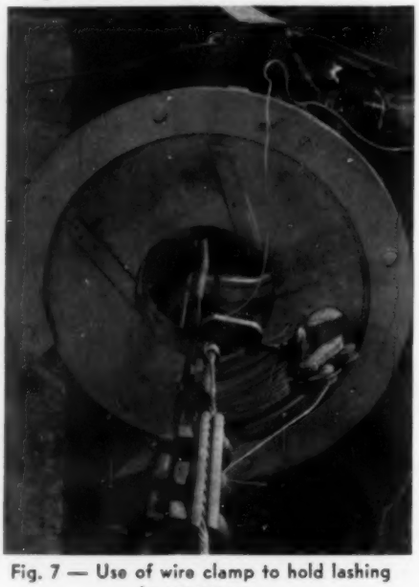

Fig. 7 — Use of wire clamp to hold lashing to messenger.

When the cable is ready for spinning, the spinner is placed over messenger and cable at the beginning of the cable run, as shown in Figure 4. The assembly is handled on the pole very much like any cable car using a handline to raise it up the pole. The gate must be locked securely after the spinner head has been placed over cable and messenger.

When the spinner is in place, next mount the lashing wire on the reel spool. The wire is then threaded through the tension rollers and sufficient slack made available for dead ending at the pole. (Note—This operation could be accomplished on the ground if desired.) The machine is now ready for operation and with the lineman in the seat, the **cable raising arm** is adjusted so that the cable is held snugly against the messenger, as shown in Figure 5. The lineman then proceeds to turn the crank, thus propelling the machine forward and at the same time revolving the spinner head and wire around cable and messenger, as shown in Figure 6.

As supporting rings are encountered they are removed and placed in a canvas tool bag which can be fastened to the spinner. When the pole is reached the lashing wire is temporarily clamped to the messenger and the spinner car transferred to the opposite side of the pole. Slack is provided for dead ending the lashing wire by releasing the wire from the tension rollers and pulling off enough for the dead end. Figure 7 shows how a small clamp is used to temporarily hold the lashing wire to the messenger.

The lineman should stand on the pole when transferring the spinner car to the opposite side, as shown in Figure 8. The lashing wire should then be wrapped around the cable by hand to complete the operation to the pole, and the clamp removed. The end of the wire should be dead ended by placing it under the head of the through bolt, or by one of the methods described in a latter part of this article.

Miscellaneous Considerations

ON new work provision should be made for some slack at splice points. This can be accomplished by placing a wood strip of adequate size

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Fig. 10—Alternative method of hanging cable by the Spinner method.

Fig. 9.—Protection of cable sheath with lead shields at splice points in messenger.

Investigation of Interstate Toll Rates Begun by FCC

By ROLAND C. DAVIES

WITH the primary purposes of achieving a substantial reduction of the interstate long distance telephone rates, the recently instituted investigation of the FCC into the interstate operations of the American Telephone and Telegraph Long Lines Department and its 21 Associated Bell System Companies is directed into many phases and issues of telephone regulation, notably in the spheres of valuation and depreciation, and may become a "landmark" probe of the New Deal wing of the Federal Government in its goal of seeking to imprint upon the telephone industry the rate-base rule of "prudent investment"' or original cost instead of the judicially accepted principle of "fair value" with the weighing of reproduction cost.

Constituting the first comprehensive telephone rate regulatory procedure in the FCC's history, the program of the investigation as outlined in the two orders of the Commission is a most significant move particularly for the Bell System, but also for the Independent telephone industry. The investigation is the first action of the FCC's new regulatory staff which was established by the last Congress with a $160,000 fund to expand the Federal agency's supervision of the telephone industry. The orders for the sweeping inquiry, which were formulated by Harry R. Booth, chief of the FCC Law Department's rate section and in charge of the legal work of the new telephone regulatory staff, were adopted unanimously by the Commission although two Commissioners had endeavored to induce the FCC to stage negotiations with the American Telephone and Telegraph Co. before instituting a formal investigation. Booth, before coming to the FCC, was the Assistant Attorney General of Illinois in charge of that state's regulatory commission litigation.

Two steps were promulgated in the FCC investigation. One called upon the American Telephone and Telegraph Co. to respond to the questionnaire in the Supplemental Order with statements and briefs by May 10 concerning two main questions of what method is to be used in arriving at the rate base and how accrued depreciation can be determined. But the questionnaire was not as simple as that because it contained nearly a score of points upon which the FCC wanted to receive the position of the A. T. & T. and Bell System. The second step is to be the staging of a hearing on June 9 when the A. T. & T. was directed to present evidence on the amount of the rate base for the Long Lines Department and upon what basis this amount is determined; what is a fair rate of return on the above rate base; and what were Long Lines Department's operating revenues, expenses and net operating income for rate-making purposes for 1938, 1939 and 1940 and for the first quarter of 1941 compared with that period in 1940.

THE FCC left a loop-hole for the expansion of the June 9 hearing beyond the presentation of these stipulated issues and informed the A. T. & T. and Bell System companies that "hearings will be subsequently set for the consideration" of other issues related to the "show cause" order regarding interstate telephone rates. This indicated a possibility that the projected FCC inquiry— which might be dubbed a "junior" Telephone Investigation because of being modeled much along the line of the 1935-38 A. T. & T. probe conducted by Commissioner Paul A. Walker under a $1,500,000 Congressional appropriation—might delve into fields like the compensation and divisions of tolls for both the Associated Bell Companies and the Independent connecting companies.

IN THE opinion of many telephone observers, both in government circles and in the industry, the drastic and sweeping FCC investigation orders come at an ill-fitting time because of the fact that the A. T. & T. and Bell Systems have been engaged in most closely coordinated and comprehensive efforts with the Army and Navy and many other governmental agencies to meet national defense emergency requirements for telephone facilities and service. The A. T. & T. and Bell System, it is a byword in the National Capital, have been engaged in this defense work with most adequate and efficient activities so that the telephone industry is rated by the leading defense authorities as undoubtedly the best prepared in national defense cooperation and accomplishments. It is also well-known that the Bell System is engaging in an enormous construction program of telephone plant needed to provide the emergency facilities for the Army and Navy and for the hundreds of new defense production plants. In 1941 the Bell System expects to expend more than $500,000,000 for new construction and spent in 1940 around $400,000,000—all of this was borne by the Bell System without borrowings from the Federal government in contrast to the defense loans sought by many other industries for their emergency activities.

ANOTHER factor in evaluating the FCC's objective of seeking reduction of the long distance rates is that in the event of a drastic cut in these charges the traffic flow will rise considerably so that the Bell System plant facilities may become crowded with the possible result of priorities for defense traffic over civilian service and with the threat that the present-day great efficiency and speed of service may be harmed and deteriorated. Other factors which should be weighed, if the FCC in the pending investigation takes a broad and impartial attitude, include the facts that wages of telephone employees are rising all over the country and the cost of materials is also increasing, together with the factor of substitute materials in telephone equipment and plant being necessitated by the shortages of strategic metals like aluminum, lead and zinc and maybe later copper.

(Turn page please)

In its order against the A. T. & T. and the 21 Associated Bell System companies, seeking a reduction in long distance rates, the FCC cited that the net operating income of the A. T. & T. Long Lines had been rapidly increasing and used the comparison of $20,160,763 net operating income in 1938 against $27,217,438 for the twelve months ended Jan. 31, 1941. The Commission asserted that the weighing of this net operating income against the Long Lines' average net investment in telephone plant had yielded a return of 6.39% in 1938, 8.19% in 1939, 8.67% in 1940 and 8.89% in the twelve months ended Jan. 31, 1941. The increased 1940 earnings, the FCC stressed, were attained despite larger pension allowances, depreciation, maintenance expenses and Federal taxes even though the company had instituted in May, 1940 the FCC's order for a $5,000,000 toll rate reduction.

IN ITS announcement about the inquiry, the FCC stated that the principles which may be established on valuation, depreciation and rate of return policies "will have a fundamental and far-reaching effect upon telephone rate regulation throughout the country." Shortly after the issuance of the FCC's orders, the National Association of Railroad and Utilities Commissioners, the organization of Federal and State regulatory bodies, declared that this investigation is a matter to receive important consideration at the April 11 meeting of its executive, legislative and cooperation committees.

Even though the special telephone regulatory legal staff of the FCC stated its questionnaire procedure imposed on the A. T. & T. to be answered by May 10 should result in avoiding complex and prolonged proceedings and place "a minimum burden of time and expense on all parties concerned," the broad scope and detailed breakdowns, propounded in the score of questions in the Commission's Supplemental Order, presented the possibility of not only voluminous replies but also prospects of a tremendous amount of compilations and research by the A. T. & T. and Bell System companies. One question was particularly significant and indicated that the FCC wanted to "jump the gun" on the courts in placing the stamp of approval on the prudent investment method of rate-base valuation. This question asked the A. T. & T. whether it would be unfair to "its investors, or to its customers, "if the original cost method was adopted as the gross rate base to the exclusion of reproduction cost.

THE sweeping scope of the questionnaire in asking the A. T. & T. to furnish statements and briefs and specific data was illustrated by the question on the A. T. & T.'s method for determination of the Long Lines rate base. The FCC asked for the amounts of telephone plant investment representing cash investment; what amount of the plant was constructed in the accounts subsequent to the 1913 Interstate Commerce Commission's uniform system; what was purchased from manufacturing companies, particularly Western Electric; what was purchased from the Associated Companies and what was constructed by the Long Lines Department. The A. T. & T. was also asked to inform the FCC how much time and expense would be required in determining reproduction costs based on spot prices; average prices for 1938-40 and for 1931-40 periods; to give its opinion on reproduction cost using the "station-to-station" basis; What would be the reproduction cost estimates based on existing plant or on the most modern plant if the station-to-station basis was utilized and the sources of price information including for reproduction cost any equipment no longer in regular manufacture. For its inquiry into Bell System depreciation practices the FCC questionnaire asked for the manner in which the present depreciation reserve of the Long Lines have been accumulated; the relationship between the depreciation reserve and the Long Lines' annual charges to depreciation expense; and the description of the method which the Long Lines considers to be a proper one for use in determining accrued depreciation.

Copies of the orders were served by the FCC on the Governor and commissions of each state in addition to the Associated Companies in the Bell System. At the same time as it issued the investigation orders, the Commission dismissed the general order of inquiry into long distance rates which has been standing since Sept. 9, 1939, and under which the FCC has succeeded in accomplishing the $12,000,000 rate reduction in 1937 and the $5,000,000 cut of May, 1940.

Convention Dates

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 22 and 23.

U. S. Independent Telephone Association Executives' Spring Conference, Stevens Hotel, Chicago, April 29 and 30.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 7 and 8.

Pennsylvania Independent Telephone Association, Penn Alto Hotel, Altoona, Pa., May 15, 16 and 17.

New York State Telephone Association, Hotel Jamestown, Jamestown, May 20 and 21. Golf day, May 19.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, May 28 and 29.

Wisconsin State Telephone Association, Loraine Hotel, Madison, June 4 and 5.

Washington Independent Telephone Association, Cascadian Hotel, Wenatchee, June 13 and 14.

Oregon Independent Telephone Association, Redmond, June 16.

California Independent Telephone Association, Miramar Hotel, Santa Monica, June 19 and 20.

Telephone Section—Association of American Railroads, Hotel Gibson, Cincinnati, Ohio, Sept. 23, 24 and 25.

U. S. Independent Telephone Association, Stevens Hotel, Chicago, October 14, 15, 16, and 17.

FCC Approves Added Cable Conductors for Transcontinental Route

The American Telephone and Telegraph Co. and the Northwestern Bell Telephone Co. received approval from the FCC Mar. 25 to modify its plans for the transcontinental twin cable toll route between Omaha and Denver with increased cable conductors with an added cost of $191,000 which bring the total estimated cost of the project up to $7,826,000. The added cable conductors will improve the facilities between Cheyenne and Denver for peak traffic loads.

In an application, the A. T. & T., Bell of Nevada and Southern California Telephone Co. proposed a toll construction project between Salt Lake City and Cedar City Junction, Utah, and between Las Vegas, Nevada, and Newhall, Cal., the latter just outside Los Angeles to provide open wire carrier systems, primarily to aid in the handling of broadcast program transmission. The estimated cost of the project which is for a 485-mile distance is $1,360,000 of which about half is for the carrier equipment. In addition, the New Jersey Bell and Bell of Pa. sought a $4,335 cable and open wire addition between Easton, Pa., and Belvidere, N. J., and the Northwestern Bell and Tri-State Telephone and Telegraph had a $3,685 project between Caledonia, Minn., and Decorah, Ia.

Selection and Ordering of Lead-covered Telephone Cable

By JAY G. MITCHELL

In this installment the author describes and illustrates some of the reasons why the replacement of open wire with cable is a normal activity in the telephone plant—The basic difference in the characteristics of open wire and replacing cable—The selection of the gauge of the copper wire conductors—The effect of the gauge of conductors on the length of cable—Transmission essentials.

WITH THE approach of spring the Management of the operating telephone company casts about for the list of plant items which are emerging from the winter season with evidences of physical weakness. This may be due to forces of nature, inadequacy disclosed by increase in the demand for service or any subnormal condition which may be the actual or probable future reason for unduly high maintenance expense. Such elements of the plant may, of course, be found anywhere but at this time it is desired to outline some of the considerations which are applicable when open wire is to be replaced with cable. The object is to suggest, especially for the smaller companies, what should be the basis of the decision as to the type of cable to be purchased. Other phases of the same general problem, the placing of the plant in condition to meet the present informed public demand for adequate and satisfactory service will, for the moment, be deferred or will be considered elsewhere.

The elimination of open wire becomes a very important matter whenever the lead becomes so large that it is difficult to maintain all the wire, when the required number of cross arms is so great as to seriously reduce the clearance below the bottom wires and the highway, when the poles are so poor due to deterioration that they are unsafe for wire supports and when municipal requirements are such as to call for the elimination of plant from the streets or its substantial reduction. Under all these circumstances and many others the installation of cable is sure to be a matter of prime importance that must be included in the budget for consideration. Such a condition is an evidence of the normal growth of the system, of the increasing age of the pole lines and of the necessity of supplying telephone service free, as much as possible, from service defects and interruptions. It is a normal condition and not a modern frill to be discarded on the theory that what, in the standards of service, was good enough in the past must be good enough for the present.

In the illustrations there are shown two views of an open wire lead which came to the author's attention recently and which is typical of the conditions found in very many of the smaller telephone systems. One view shows the heavy lead with one eight pin and two ten pin cross arms all in obviously poor condition and all full. In the other view which is only a few sections away on the same road the entire lead is carried under a railroad trestle on **reversed cross arms,** an arrangement which is almost certain to cause an undue number of service failures. In any condition such as those shown it is almost obvious that the substitution of cable for the open wire is entitled to the most careful consideration by the management. In such matters the manufacturers and supply dealers will be found to be able and willing to extend their assistance in many ways and, when the placing of toll lines in the proposed cable is a factor the advice and help of the company supplying the long distance service should always be obtained. Cable construction always involves many problems in plant and economics, such as the decision as to whether the cable is to be placed under-

Two views of the same lead before it was displaced by cable.

ground or suspended on poles, whether or not the existing poles are suitable for use after the open wire shall have been removed in case of aerial construction and the study of the service development and location of distribution points for service to local stations. This will be strictly confined to the Selecting and Ordering of Telephone Cable on the assumption that all these other decisions and studies have been completed.

Basic Difference between Cable and Open Wire

THE GENERAL idea which should be firmly kept in mind when ordering cable, especially when the cable is to completely replace open wire, is that the number of possible circuits that may be served through any cable is fixed at a definite maximum. In the case of an open wire lead, on the other hand, it is always possible to string another circuit even if all the pin positions are occupied when pair wire can be used temporarily. There was a saying among the plant employees during the early experience of the author, however, that temporary construction was never removed until it was worn out and there is enough truth in this to serve as a warning to the plant forces against thoughtless temporary stringing of pair wire in open wire leads. Careful examination of the open wire lead in the illustrations will disclose some pair wire, strung because the pin space is all occupied.

With cable, however, the number of pairs available is obviously sharply limited to the number in the cable. The importance of this fact lies in the necessity of providing, in the proposed cable, for the **maximum** number of circuits that may reasonably be expected to be required during the period in the future for which the proposed new plant must be adequate. This does not mean the same number of pairs as are presently in service in the open wire lead being displaced but instead the number of pairs found to be the probable requirement for some time in the future as disclosed by an accurate and carefully made development study. Certainly no additional pairs can be installed in the finished cable when the demands for service have exhausted its capacity. The cost of installing a larger size of cable than appears to be presently required will always be less than the cost of a smaller cable plus the cost of additional circuits or cable afterward. The primary requirement, therefore, for the new cable is an ample number of pairs to assure facilities for service demanded by the public in the territory served in the future as disclosed by a carefully made and accurate study. In exactly the same way, when additional cable is needed, the number of pairs **in the additional cable** must be large enough to meet the probable demands for service likely to be imposed upon it as determined by a carefully made and accurate development study. Such studies must, of course, take into consideration the present requirements for service, the probable future growth of the community, projected commercial and industrial developments and all other factors which exert any influence upon the amount of service facilities that must be provided throughout the life of the proposed cable construction. The subject of Development Studies, however, is one requiring more extended treatment than it is advisable to attempt in this installment and it will be assumed, therefore, that such studies have been made and that the maximum number of pairs that must be provided by the proposed new cable is one of the given factors available to the executive having the matter under consideration. This explanation eliminates from further discussion the question of the capacity, in pairs, to be specified when placing the order for the new cable.

LENGTH OF SUBSCRIBERS' LOOP HAVING RESISTANCE OF 635 OHMS FOR VARIOUS GAUGES OF COPPER CABLE CONDUCTORS

Gauge of Conductors B. & S.	Resistance of Loop in Ohms †	Circuit Length of Local Loop in Feet
19	635 *	36,440 *
20	635 *	29,410 *
22	635 *	18,220 *
24	635 *	11,560 *
26	635 *	7,290 *

†—Subject to some variation in the product of various manufacturers.
***—Exclusive of substation equipment and interior wire.**

Gauge of Conductors

THE NEXT item for consideration, it would seem, is the gauge of the wire conductors in the proposed cable. While this phase of the matter is under consideration it would be well, if any long distance circuits (whether toll or not) are to be carried through the proposed cable, to consult with the company from which the Long Distance service is taken. The reason for this is that the long distance circuits, when carried through the cable, will, in all probability, require that certain pairs be arranged in quads and such a requirement will probably preclude the use of stock cable in many cases. Should the long distance circuits be carried in open wire in the present lead which is to be replaced it may be feasible to still retain the open wire long distance circuits when the local circuits are being placed in cable. Such an arrangement will effect a very considerable saving in the cost of the new cable and is often preferable, for transmission efficiency, to the placing of the long distance circuits in the new cable. Assuming that this is to be the arrangement, that is that the long distance circuits are to be brought in to the Central Office in open wire, then the gauge of the wire conductors in the proposed new cable can be determined.

It is very true that the gauge and hence the resistance of the wire conductors in the cable is much more important in manual common battery and dial offices than it is in magneto offices. Nevertheless it is definitely recommended that the requirements for manual common battery or dial be allowed to govern when cable is being selected for **any office.** In other words it is recommended that the proposed cable be selected just as it would be if the office in which it is to be installed were now served by common battery manual or dial equipment. The importance of this provision lies in the fact that the loop resistance of the longest subscriber's circuit may well be sharply limited to the satisfactory line operating characteristics of any equipment likely to be installed in the office at some future time.

In *open wire,* as compared with cable, the requirements as to mechanical strength imposed by weather hazards such as glaze storms and high winds eliminate any necessity of giving consideration, in many office service areas, to the maximum resistance allowable in the average subscriber's loop because the open wire must be so large, for mechanical strength, that its ohmic resistance is sure to be less than the allowable maximum for the average subscriber's loop. When the subscriber's circuits, on the other hand, are carried through cable the smaller gauge of the conductors, in comparison with the open wire, becomes one of the controlling factors.

IN GENERAL it may be said, although this is subject to the requirements of the equipment in use, that the normal ohmic resistance of the subscriber's loop, exclusive of substation equipment and interior wire, should not exceed 635 ohms. Every effort should be made to limit the resistance of most of the subscribers' loops to this figure **unless the manufacturer of the equipment to**

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USITA MAKES STATEMENT ON DEPRECIATION

DURING 1940 the Depreciation Committee of the National Association of Railroad and Utilities Commissioners, of which Committee Hon. Nelson Lee Smith of the New Hampshire Public Service Commission is chairman, invited the United States Independent Telephone Association to cooperate with it in a study of all phases of depreciation, particularly as affecting public utility companies. The Telephone Association appointed a special committee for this purpose, chairman of which is E. C. Blomeyer of Chicago. The remaining members are: Ranford Dunlap of Fort Wayne, Indiana; W. C. Henry of Bellevue, Ohio; Gustav Hirsch of Columbus, Ohio; J. W. Morrison of Rochester, New York; H. W. Pike of Madison, Wisconsin; H. H. Wheeler of Lincoln, Nebraska.

The Depreciation Committee of the Telephone Association decided that as a matter of cooperation with the NARUC Committee it should file with that Committee a statement of the position of the United States Independent Telephone Association on depreciation. Consequently the statement was drafted by the Telephone Committee on this subject, this statement being generally a restatement of the position taken by the Telephone Association on this subject during some years past. This statement was filed with the Chairman of the NARUC Committee on March 24, 1941, and is as follows:

—1—

This Association is in favor of research and study on all phases of depreciation, and it will to the best of its ability cooperate in such work on questions affecting Independent telephone companies, with other organizations having an interest in the matter.

It is, however, our belief that no amount of research and study can determine, in advance, the actual cost of depreciation, and that percentage rates of depreciation arrived at through such studies should be recognized and dealt with by all concerned as what they really are; namely, considered *estimates* of the cost of depreciation.

—2—

This Association believes that, even if it were possible by any method to estimate in advance with absolute acuracy the service life, salvage value and cost of removal of property worn out in service, it would still be impossible to estimate in advance the future costs, for any given period, of such elements of depreciation as obsolescence and inadequacy. These costs, brought about by changes in public demand and improvements in the art, cannot long be foretold and cannot be fully controlled by management. Either of them may substantially change the actual cost of depreciation during a period of time. For that reason we are opposed to any plan which requires an Independent telephone company to state the cost of its depreciation on the basis of some fixed formula which deprives management (which must necessarily make the decisions relative to retirements for causes other than wear) on all discretion in the matter either of such retirements or of the amount to be provided for the depreciation cost thereof during any given period.

—3—

This Association represents the Independent Telephone companies, which are under many different ownerships. Each of these Independent companies (the great majority of which are small companies) must stand on its own feet from the standpoint of depreciation, earnings, etc. Any system of computing the cost of depreciation which is based on averaging the service life, salvage value, etc., of a large amount of telephone property located in a large number of places will be inaccurate when applied to most Independent telephone companies, which are comparatively too small and have comparatively too little property to be safe in computing their depreciation costs on such broad averages. For this reason we believe that computations of the cost of depreciation of Independent telephone companies must be based upon the actual, individual situation of each particular unit or company.

—4—

This Association believes that a principal aim in all research and study on the question of depreciation should be to simplify the whole question as much as possible. In final analysis the whole proposition, when applied to utility companies, can be reduced to one simple question, namely:

> What amount, in justice both to the patrons and to the utility, should any given utility company include in its operating expenses during a given period to cover the cost of its depreciation?

We are not in favor of the required use of so-called "age-life" or "annuity" or "compound interest" or other plans of the kind as substitutes for the so-called "straight-line" method of computing the annual cost of depreciation, because these plans are complicated methods of doing a thing which can be done more simply, and which should be done as simply as possible.

We believe that, as a matter of simplification as well as for other reasons, Independent telephone companies should not be required to maintain separate depreciation reserves for each of their primary accounts of depreciable plant. The average Independent company to which this accounting provision would apply cannot provide, without expense, the engineering and accounting facilities necessary to maintain such separate reserves on even a reasonably accurate basis, and we do not believe the value of such sep-

arate reserves to either the regulatory commissions or the Independent companies justifies, under such circumstances, the cost involved in maintaining them.

We believe that the total of the monthly accruals for depreciation made by an Independent telephone company during a year and based on a composite percentage rate arrived at from estimates of service life, salvage value, etc., should be subject, at the year end, to review by the management, and to revision if there has occurred, during the year, any situation or happening which materially affects the accuracy or reasonableness of the percentage rate used during the year.

We point out that management has an obligation to the security holders to state, in the financial reports of the business, amount that should be included in operating expenses to cover the cost of depreciation.

We state our opinion that no amount of research and study for the purpose of ascertaining, in advance, the future cost of depreciation, can be so correct that the question of cost of depreciation can be eliminated as an issue in rate cases, and therefore that this question, in the ascertainment of proper rates for service, will necessarily continue to be one to be examined into and dealt with each time the rates are fixed.

—5—

This Association does not believe that the cost of depreciation of any continuously existing utility property can ever be reduced to absolute exactness. We think it highly commendable to research and study questions of depreciation as much as possible, and even continuously, and believe that the regulatory bodies, the utilities and the various associations and others who are interested in the question should cooperate, as far as they practically and properly can, in bringing out and analyzing facts and divergent views on the whole question. We particularly commend the comprehensive study of the matter now being carried on by the Depreciation Committee of the National Association of Railroad and Utility Commissioners, and the Special Committee on Depreciation of the United States Independent Telephone Association will cooperate to the best of its ability with the committee of the NARUC, to such extent as that committee desires our cooperation. We think, however, that it must be recognized by regulatory bodies, utility managements and the public that, in finality, the best that can be done is to estimate, as scientifically as possible, the real cost of depreciation, and to apply such estimates, both as to the procedure of dealing with them and as to the amounts resulting from them, with fairness so far as possible, to both the public and the utilities.

* * * *

The foregoing is a statement of the United States Independent Telephone Association, taken from past resolutions and other actions of the Association on the question of depreciation as affecting Independent telephone companies and revised to meet current situations, and approved by the Special Committee on Depreciation and the Board of Directors of the Association.

H. W. Hubenthal, popular secretary of the Oklahoma Telephone Association, was re-elected.

CONVENTION REPORTS

OKLAHOMA

THE 1941 annual convention of the Oklahoma Telephone Association was, according to H. W. Hubenthal, secretary, perhaps one of the best in the history of the Association. The most interesting and important features of the meeting were matters pertaining to National Defense and State Legislation. It was held in Oklahoma City March 24 and 25.

Entertainment features included the annual convention dinner with J. W. Walton, Broken Arrow, as toastmaster.

C. E. Devin, Apache (Okla.) Telephone Co., was re-elected president. Endsley Jones, Div. Supt. of the Western Light & Tel. Co., was elected 1st vice-president; L. M. Baker, Southwest Tel. Co., Purcell, as 2nd vice president; H. W. (Hube) Hubenthal, secretary, and M. A. Sanders, Southwestern Bell, Okla. City, treasurer.

The Board of Directors now consist of Mr. Devin; A. G. Davidson, Southwest Tel. Co., Brownwood, Texas; Mr. Jones; Mills Roberts, Southwestern Associated Tel. Co., Waynoka; Mr. Baker; C. G. Gardner, Sentinel (Okla.) Rural and L. D. Tel. Co.; Mr. Walton; Warren S. Miller, Southwestern Bell, Okla. City; J. M. Nelson, Skiatook (Okla.) Sperry Tel. Co., and A. L. McFadden, Ringwood (Okla.) Tel. Co.

Speakers included: Mr. Devin, Mr. Hubenthal, Mr. Nelson, Miss Genevieve Thompson, a toll operator, John H. Cantrell, executive vice president Louis Pitcher of the National Association, Mr. Barker, J. B. Bohlen and Mr. Davidson.

Secretary H. W. Hubenthal reported that eight new members joined the Association during the year, and that the Association handled 1275 technical and practical matters on almost every phase of the telephone industry for the benefit of member companies. He also reviewed a list of legislative bills which, if passed, would adversely affect the telephone industry.

(Please turn to page 56)

Seated at the Kansas Telephone Association banquet are from left to right: Mrs. C. A. Krueger and Mr. Krueger of Ellinwood; H. C. Todd, Maryville, Mo.; Joe M. Roberts, Gallatin, Mo.; J. H. Kellogg, Chicago; Mrs. H. E. Baker, Overbrook.

Thanks FOR THE *Suggestions!*

The universal Type "O" "Sub-Station Protector" is suitable for indoor or outdoor installation. It features an indexing mounting bracket which permits the bracket to be installed separately and the protector unit to be turned on the bracket for convenient wiring. It also provides Tru Gap Lightning dischargers, fuse protection, sturdy non-corrosive Everdur cover, and phosphor bronze fuse clips. Now adopted by successful operating companies as standard equipment.

YOU will find *your* ideas built into Cook protection and distribution equipment . . . *your* ideas of easy installation, quality materials and manufacture, and long, dependable service . . . *your* ideas as you would build them, because Cook engineers maintain constant contact with telephone linemen, maintenance men, plant men, and executives.

Your ideas because Cook engineers so thoroughly understand your problems . . . know from more than forty years' experience just what is required to meet your most exacting demands for reliability, safety, and economy.

And Cook is able to meet your ideas of service, too. You will find Cook products sold by all telephone equipment manufacturers and supply houses everywhere.

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ELECTRICAL
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ROEBLING makes available a wide variety of electrical wires and cables to meet practically every telephone and telegraph need. In addition to those shown, Roebling makes:—Parallel Telephone Wire ...Rubber Insulated and Braided, Bare Copper and Bronze Wire, Bare Galvanized Steel Wire, Galvanized Steel Strand.

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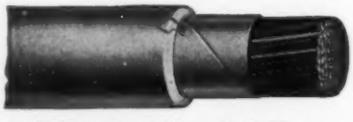

Telephone Switchboard Cable .... Silk and Cotton Insulated and Leaded

Twisted Pair Telephone Wire .... Rubber Insulated and Braided.

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ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Communications News

(Continued from page 24)

Acquisition Hearing

A LONG, long trail looms ahead in the prospect of the acquisition and consolidation by two Bell System companies, the New Jersey Bell and the Bell Telephone Co. of Pennsylvania, of the properties of the Keystone Telephone System in Philadelphia and southern New Jersey which would terminate the final major situation of Bell-Independent competition in the same territory in the United States. The first step towards the plan of consolidating this Independent telephone system with its approximately 45,000 stations into the Bell System was instituted by the New Jersey Bell in seeking FCC authorization for its acquisition of the capital stock of the Imperial Securities Co., a Theodore Gary & Co. subsidiary, which controls the Keystone companies.

The FCC engaged in initial hearings on this plan in Washington during early April and, although its sessions lasted for 3½ days, several other proceedings are slated to be staged before the record on this application can be transmitted to the Commission for action. The initial Washington hearings were consumed with the presentation of direct testimony by seven officials of the New Jersey Bell and Bell of Pa. in which Chester I. Barnard, New Jersey Bell President, presented the exposition of the history of his company's agreement with Imperial Securities to acquire its stock and of the public advantages and benefits to be gained in eliminating duplicate telephone systems. Mr. Barnard related the history of eliminating competitive telephone systems in Pennsylvania after the World War when such steps had been advocated by former Postmaster General Burleson.

The next hearing on the Imperial acquisition is slated to be held in Philadelphia on May 5 when minority stockholders of the Keystone Co. and large users of the Independent system, particularly in Philadelphia, will present their views on the proposed consolidation of the Keystone System with the two Bell Companies. The FCC and the Keystone Co. counsel reserved cross-examination during the recent Washington hearings until the next session in Philadelphia.

Both the New Jersey Bell and the Bell of Pa. presented in the Washington proceedings lengthy testimony on the financial structure of the Keystone System, the valuation of its plant, its commercial operations and what the respective Bell Companies plan to do with its plant and equipment, together with the rate treatment of its subscribers, in event of the consolidation. The eventual acquisition of the Keystone Company and its subsidiaries will have to be approved by the New Jersey and Pennsylvania commissions and the FCC.

The witnesses at the Washington hearing, besides Mr. Barnard, included J. W. Wopat, Independent telephone consulting engineer who testified about a 1934 inventory of the Keystone plant and a 1939 reappraisal, the latter for the New Jersey Bell; Aaron Wallace, New Jersey Bell General Supervisor of Reports; Ralph E. Crowell, New Jersey Bell Commercial Engineer; for the Bell of Pa.; George A. Doyle, Commercial Engineer, J. E. Murdoch, Eastern Area Chief Engineer and W. A. Peterson, General Auditor.

New Examination For Engineers By Civil Service Commission

A new drive for Engineers was begun by the Civil Service Commission on April 7, with the announcing of an Engineer examination which includes all branches of engineering except chemical, metallurgical, marine, and naval architecture which are covered by previously announced examinations.

The new Engineer examination cancels and supersedes the following examinations announced in 1940: Mechanical (No. 61); Aeronautical (No. 64); Senior Engineer (No. 83); Senior Civil Engineer (No. 98). However, persons who have been rated eligible under these four examinations will have continued eligibility.

Applicants must have completed a four-year recognized college course except that provision is made for the complete substitution of qualifying professional engineering experience of the proper quantity, type, and quality, for the education lacking. Additional professional engineering experience, differing in kind, length, degree of progression, and responsibility, according to the grade and branch of the position applied for is also required except that graduate study in engineering may be substituted for part of the experience. The maximum age limit is sixty years.

Engineers qualified in the following specialized fields are particularly needed for the National Defense program and are urged to file their application at once: Aeronautical, Agricultural (Farm Machinery), Construction

(Airports and Buildings), Heating and Ventilating, Mechanical (Industrial Production and Diesel Design), Ordnance, Radio, Safety, Sanitary (especially Public Health), Structural (Building Design), and Welding.

The duties of these positions will include design, construction and research in the various branches of engineering. The positions pay from $2,600 to $5,600 a year. Applications will be rated as they are received at the Commission's Washington Office until June 30, 1942.

Further information and application forms may be obtained at any first- or second class postoffice or from the Civil Service Commission, Washington, D. C.

Refuses Sale of Connecticut Independent

The New York Public Service Commission late in March handed down a decision refusing to sanction the sale of part of its telephone plant by a small Connecticut Independent telephone company to a New York Independent. In denying the petition of the Sharon Telephone Co., Sharon, Conn., to sell a portion of its Milerton, N. Y., exchange to the A. M. Johnson Telephone Co., the state body cited that the plant "is located considerably beyond the operating area of the Johnson company." The fact that the units could not be physically interconnected was also a major basis for the decision.

The Johnson company operates around 270 stations in the town of Hillsdale and in part of the town of Copake. While the Sharon concern has around 435 stations in the vicinity of Sharon, Conn. and the village of Milerton, Duchess County, N. Y.

The plan of the Sharon company to sell its New York exchange would relieve it from FCC jurisdiction except as a connecting carrier. The Southern New England Telephone Co. and the Sharon Co. have applied to the FCC for the $1,460 construction of six copper toll wires between Sharon and Millerton.

B. M. Witmer Selected

B. M. Witmer, formerly manager of the Hanover (Penn.) District, has been appointed general commercial manager of the United Telephone Company (Penn.) to fill the vacancy created by the elevation of Lester R. Thurston to the post of vice president and general manager. James H. Earley, advertising and directory manager, has been named general traffic manager; and C. A. Bixler, formerly manager of the Gettysburg District, has been assigned to the Hanover District to succeed Mr. Witmer.

A STRONG SUPPORT

FROM A STRONG SUPPLY SOURCE

Rainier Crossarms have the seasoned strength that's needed to help your lines withstand the stress of severe ice and wind loads. They are made of clear Douglas Fir. Careful control of seasoning under the supervision of experts adds to the natural strength of the wood. They are practically moisture- and rot-proof—a vital factor to long-time service life.

Your GRAYBAR Man can also supply Rainier pins, brackets, etc. In fact, he can fill any of your requirements from the "top of the pole to the bottom of the hole." He offers performance-tested items from a range of types and designs so wide that you're sure to get exactly what you want. What's more, you get it *when you want it* from this "one-call" supply source.

Next time you need pole-line items, remember GRAYBAR. You'll get quality products and cooperative service no matter how large or small the item.

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IN OVER 80 PRINCIPAL CITIES
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GraybaR QUALITY
Everything Electrical
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Fig. 1 — Recommended Sizes of Linesman's Pliers.

Fig. 3 — Required Digging Tools.

Wire Chief's Training Course

(Prepared Expressly for **TELEPHONE ENGINEER** *magazine by the Lincoln Engineering School)*

Section II – Construction Tools and Trucks

General

IN THE small and medium size Independent telephone exchange the Wire Chief must have a good working familiarity with outside plant work. He should be familiar with the tools and materials used in outside construction and subscribers station installation. He should have some knowledge of the type of transportation required and the most efficient arrangement of tools and materials in the vehicle used. It is the purpose of this section of the Wire Chiefs training course to discuss the more common tools and types of trucks used in Independent plants.

Lineman's Tools

LET US first consider the smaller tools used in outside construction work and which we can properly designate as **lineman's tools.**

The most essential item in the lineman's tool kit is pliers. There is no substitute for good pliers and it is false economy to buy anything but the best. Though there are a number of different types and sizes of pliers, the most popular and commonly used in outside construction work is the 7 inch side cutter. This size and type of pliers is amply large for the line wires handled and sufficiently compact in size to be used in both light and heavy work. It is sometimes the practice to carry a pair of 8 inch side cutting pliers on the construction truck for exceptionally heavy work and particularly for use in connection with guy strand.

In addition to the side cutting pliers the lineman should be equipped with a pair of 6 inch long nose side cutters and a pair of 5 inch diagonal pliers. These are useful in terminals, station installation work, etc. Two popular types of the recommended sizes are shown in Figure 1.

If double tube sleeves are used the

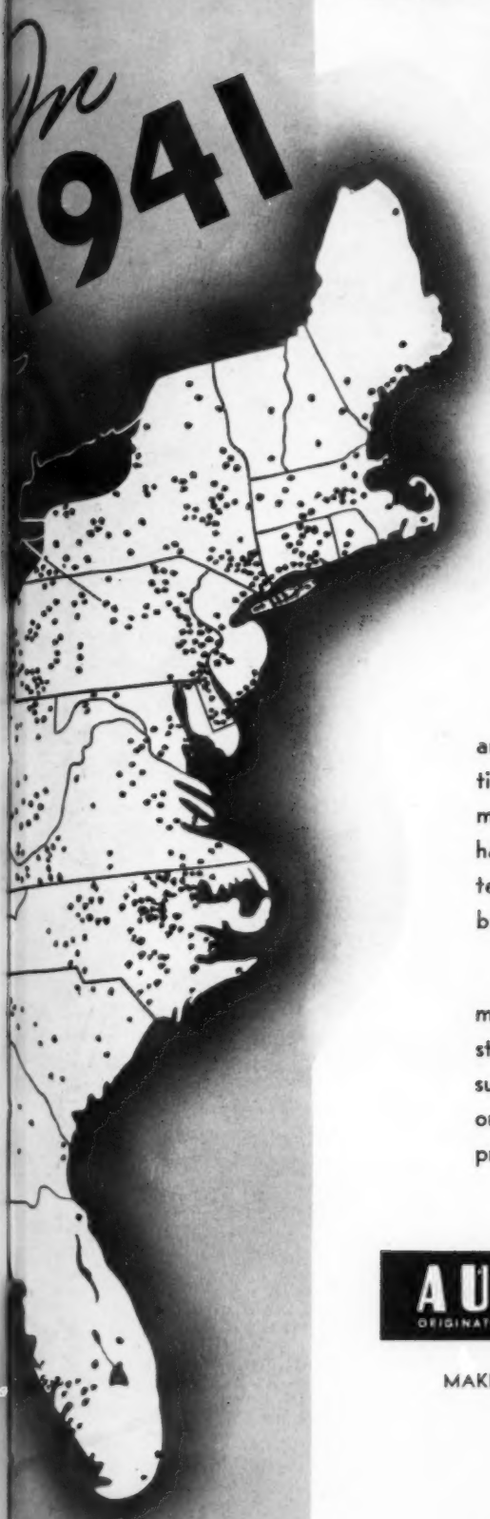
(Please turn to page 59)

FREE TRAINING FOR ALL SUBSCRIBERS

This is the second section of the free training course which started in the March issue. Many subscribers have already sent in lessons which have been promptly corrected and returned to them together with printed standard answers. Upon completion of the course a handsome certificate will be issued without charge to each individual sending in lessons. There are no obligations or charges the only requirements being that the individual submitting lessons be a subscriber and that 6 cents in stamps be sent in with each set of lessons to cover return mailing costs.

The course will cover all phases of telephone work including outside plant design and construction, c.o. circuits and maintenance, cable work, etc.

Take advantage of this offer now by sending in your answers to the examinations at the end of each section to TELEPHONE ENGINEER—Homestudy Division—7720 Sheridan Road, Chicago. This is but one of the many fine features of TELEPHONE ENGINEER MAGAZINE.



AUTOMATIC ELECTRIC LED THE WAY-

In Pioneering the Small Unattended Automatic Exchange

Back in 1916, at Fifield, Wisconsin, Automatic Electric Company installed a new type of telephone switchboard for the small exchange. This board—called a Community Automatic Exchange, or C-A-X—established a new conception of service for small communities. It was unattended; it operated 24 hours a day; it brought fast, dependable connections, low maintenance and stable, profitable operation.

This installation marked the beginning of the use of unattended automatic switchboards for small exchanges. Every year since that time, Automatic Electric has led the telephone field in the development, manufacture and installation of that type of equipment. Its experience has extended to meeting every climatic and traffic condition encountered by telephone companies operating not only in the United States, but in practically every other country of the world as well.

Automatic Electric's origination of the C-A-X idea, and its development of low cost, low maintenance C-A-X equipment, makes possible stable operation for small companies—and, in addition brings to their subscribers modern, 24-hour telephone service. Why not consult with our representative — or write to us direct — about your small exchange problem?

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LINE and DESK

EDITED BY B. C. BURDEN, Technical Editor

ADDRESS YOUR QUESTIONS TO LINE AND DESK EDITOR. NO CHARGE.

Q. In the construction of a buck arm corner what spacing should be employed between the two cross arms?

A. Generally the two arms are placed within two to three inches of each other and arranged as shown in Fig. 1.

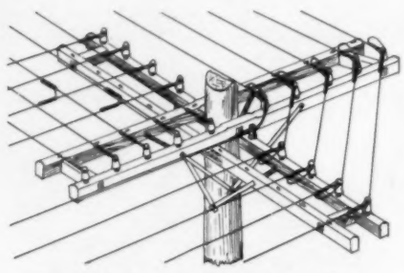


Fig. 1—Buck arm corner construction.

Subscribers Stations

Q. What is the resistance of a typical station ground rod to earth?

A. It varies greatly depending on the conductivity of the soil at the point at which the rod may be placed. Generally speaking, it will range from 20 ohms to as high as 200 ohms in average soil. Where an exceptionally good ground is required as for example at the central office, it is customary to drive down from 3 to 6, eight foot ground rods, all of which are connected in multiple, thus providing a much lower ground electrode resistance than would be possible with a single rod. The rods should be placed from 6 to 10 feet apart if this method of reducing the station ground resistance is to be effective.

Cable, Conduit, and Drop Wire

Q. Is it practical to place rings on a messenger before the messenger has been carried up the pole?

A. No, it is not and the customary method of placing rings is to ride the messenger in a cable car and as the rings are snapped in place No. 12 iron wire is laid in the ring. This wire serves as a pulling in wire for small cables or to pull in a larger wire or rope for long pulls of heavy cable. No. 12 wire is suitable for pulling up to 1000 feet of 150 pair 24 gauge cable.

Q. Please tell us what size cable ring should be used for various sizes of 24 and 22 gauge cable.

A. Standard practice dictates the following size rings to be used.

No. 24 ga. Cable	**Ring Size**
No. of pairs 15 to 200	1½"
No. of pairs 250 to 600	2½"
No. of pairs 600 to 900	3"
No. of pairs 1200	3½"
No. 22 ga. Cable	**Ring Size**
No. pairs 15 to 150	1½"
No. pairs 200 to 400	2½"
No. pairs 400 to 600	3"
No. pairs 600 to 900	3½"

Q. Is a lubricant necessary when placing aerial cable?

A. When pulling in fairly large cables it is sometimes found desirable to use a lubricant of soft soap which tends to reduce the friction between rings and cable. This practice is also followed in connection with old cable which is being reused.

Q. Please advise what sizes and lengths of lead sleeves are required for various sizes of 22 gauge cable for straight splices.

A. The following table gives the type sleeve for straight splices.

No. Pairs of Cable	Inside Diameter of Sleeve in Inches	Length of Sleeve Required in Inches
25	1	15
50	1¼	15
100	1½	15
200	2¼	17
300	2¾	20
400	3	20
600	3½	20

Q. In boiling out paper insulation cable conductors to what temperature should the paraffin be heated.

A. If a thermometer is available the temperature should be approximately 380° F.

Central Office

Q. What is the best method in routine cleaning relay contacts to remove the dust and grease film that may have accumulated?

A. Where a number of relays are to be cleaned, the following method is recommended: Using clean tooth picks of the flat type apply a drop or two of carbon tetra-chloride to the contact points which should be held open. Next, saturate the flat end of the tooth pick with carbon tetrachloride and insert between the relay contacts. Move the tooth pick back and forth applying sufficient pressure so that the tooth pick rubs firmly against both contact faces. The carbon tetrachloride will at as a solvent for dirt and grease which the pick will tend to remove. Be careful not to get the carbon tetrachloride on rubber bushings and insulating washers.

Q. How can the resistance of a central office ground be measured?

A. In order to determine the resistance to earth of a ground electrode it is necessary to use what is known as the **triangulation formula** in conjunction with two auxiliary ground rods.

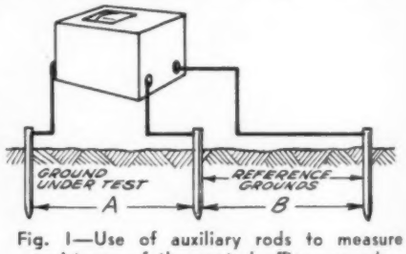
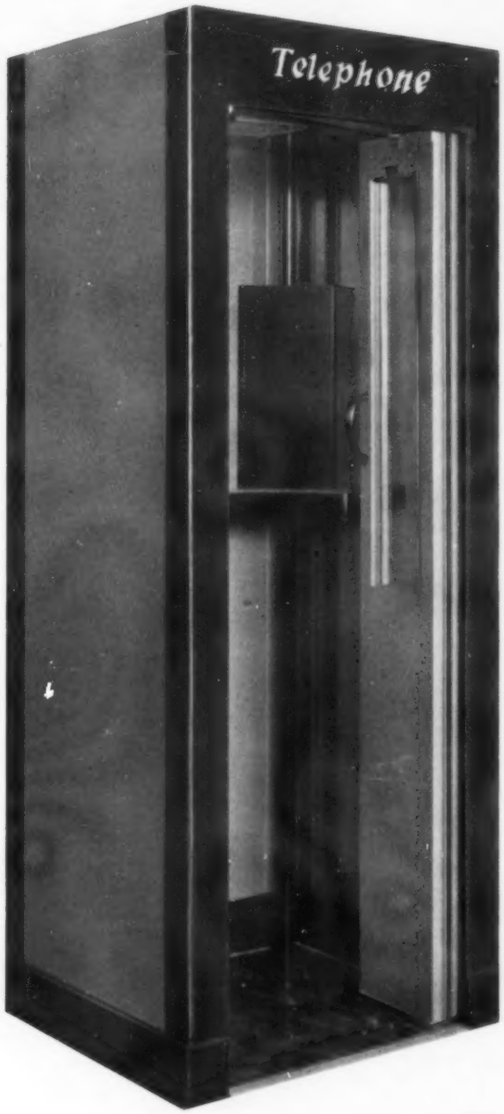


Fig. 1—Use of auxiliary rods to measure resistance of the central office ground.

The resistance readings are taken between the several combinations of the three electrodes and these resistance readings are combined in the formula $X=\frac{1}{2}(A+B+C)-C$. Where X is the unknown resistance, A is resistance between auxiliary electrode No. 1 and the regular electrode, B is resistance between electrode No. 2 and the regular electrode, and C the resistance between auxiliary electrode No. 1 and auxiliary electrode No. 2. The actual resistance measurement should preferably be made with a Wheatstone Bridge using an A. C. tone in place of the battery and earphones in place of the galvanometer. The use of an A. C. tone in place of battery tends to eliminate the effect of earth potentials on the measurement. An instrument is available which permits measuring the ground resistance directly without computation. It is connected as shown in Fig. 1.

Announcing the

ACOUSTIC STEEL TELEPHONE BOOTH



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Outside Booth Dimensions
30" wide x 30" deep x 83¾" high

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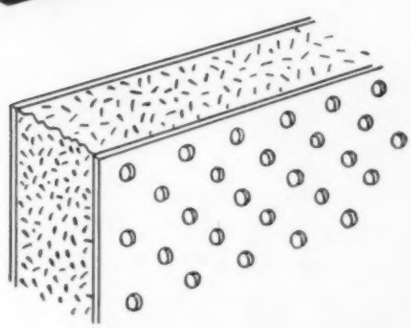

Section of wall panel showing acoustic material and perforated lining. Sounds entering booth pass through thousands of small holes and are absorbed by acoustic material.

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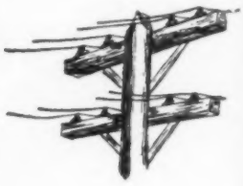
LONG LINES



Conducted by R. A. CLARK, JR.

Pole Line Design

MOST of us have occasion to design a new pole line now and then and in this article I hope to present some data which will be of assistance in planning the construction.

There are several quantities which must be known before a good design can be determined. The first is the number of wires which the line may be expected to carry during the life of the poles. Also we must know whether there will be any foreign attachments or loads other than the open wire. In case the line carries cable and other wires it is convenient to rate this load in terms of the equivalent number of telephone wires. Table 1 is useful for this purpose. It shows the equivalent wire load in all three of the sleet loading areas for various size cables and large power conductors.

The second item to be decided upon is the class of construction. Obviously a line having long toll circuits routed over it is more important than one used for rural subscribers. For convenience lines have been classified in three groups as follows:

Class A, suitable for high grade toll and exchange lines of open wire or cable.

Class B, suitable for medium grade lines of open wire or cable.

Class C, suitable for rural lines.

After having decided upon the grade of construction we can refer to Table 2 which shows the minimum classes of poles for the various sizes and grades of lines.

In making use of Table 2 it is obviously necessary to decide on the average span length to be used. This depends somewhat on the choice of the conductor material. For example with the new high strength galvanized steel wires the spans can be increased over those used for No. 9 copper. A choice of poles must also be made and to assist in determining the most economical pole, Table 3 showing the average life of various kinds has been prepared. This table is based on studies made over a long period of time and is fairly representative of average conditions throughout the United States. As you all know, the new pole classification provides the same strength line for a given class pole regardless of the timber. In other words, a class 6 creosoted pine pole will be just as strong as a class 6 chestnut even though the butt diameters are quite different.

The above tables are the results of both calculation and field experience and therefore may be relied upon to provide a sound and economical construction.

Table 1. Equivalent Wire Load of Cable and Large Wire Attachments

Attachment	Heavy Loading Area	Medium Loading Area	Light Loading Area
One twisted-pair drop wire	1	2	4
One 2-lb. cable (and smaller)	4	5	15
One 5-lb. cable	5	6	22
One 8-lb. cable	6	7	30
One No. 6 A.W.G. wire	1	2	4
One No. 4/0 A.W.G. wire	1	2	6
One 250,000-850-000 cm. conductor	2	3	12

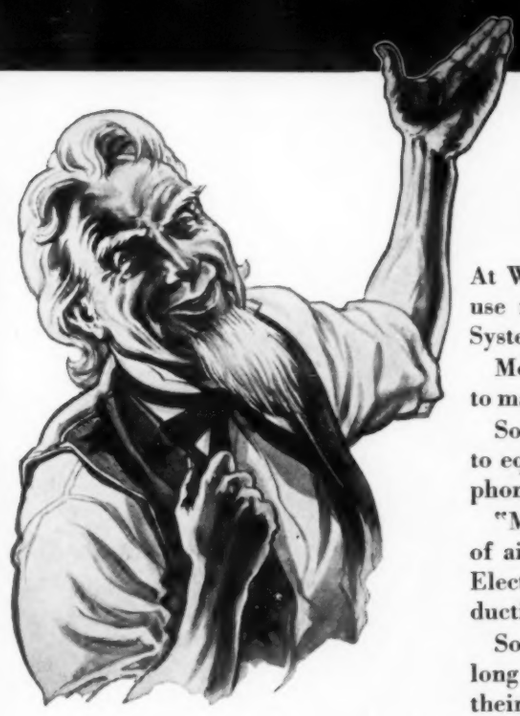
Table 2. Minimum Classes of Poles for Various Sizes and Grades of Lines

Equivalent Wire Load	Span Ft.	Class A Lines			Class B Lines			Class C Lines		
		Heavy*	Medium*	Light*	Heavy*	Medium*	Light*	Heavy*	Medium*	Light*
5	275	6	7	7	7	7	7	8	8	10
	200	7	7	7	7	7	7	8	9	10
	150	7	7	7	7	7	7	9	9	10
	120	7	7	7	7	7	7	9	9	10
15	275	3	4	7	6	7	7	7	7	9
	200	4	6	7	7	7	7	7	7	9
	150	5	6	7	7	7	7	7	8	9
	120	6	7	7	7	7	7	7	8	9
20	275	2	4	7	5	7	7	7	7	8
	200	3	5	7	6	7	7	7	7	9
	150	4	5	7	7	7	7	7	7	9
	120	5	6	7	7	7	7	7	8	9
30	275	1	3	7	4	6	7	6	7	7
	200	2	4	7	5	7	7	7	7	8
	150	3	5	7	6	7	7	7	7	8
	120	4	5	7	7	7	7	7	7	8

* Loading district classification

Table 3. Average Life of Wood Poles

Location in the United States	Chestnut		Butt-treated Cedar		Creosoted Pine
	Untreated	Butt Treated	Eastern	Western	
North	20	30	32	30	45
Central	15	25	27	25	35
South	12	20	23	20	30



"and that's good news for the National Defense!"

At Western Electric we're producing telephone equipment for use now which normally would not be required for the Bell System's nationwide service for two or more years.

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"More telephones for these new plants," is the urgent demand of aircraft manufacturers and other defense industries. Western Electric's response cuts weeks and even months out of usual production schedules.

So in this time of need, as in calmer days, Western Electric's long experience and manufacturing facilities are demonstrating their worth to the nation.

Western Electric *. . . is back of your Bell Telephone service*

Save from $30 to $90 per year on PAX and PBX installations. Raytheon RectiFilteRs are battery eliminators which require no servicing or maintenance, provide low cost DC power. Plug in a RectiFilteR and forget it.

Six years experience of many large independent telephone companies have proved Raytheon RectiFilteRs exceptionally satisfactory and economical for DC supply to PBX boards. The time and cost of routine battery inspection is eliminated. Equipped when necessary, to furnish DC during AC interruption. Write for bulletin DL-48-156F.

RAYTHEON MANUFACTURING CO.
134 WILLOW STREET, WALTHAM, MASS.

The New Cable Spinner

(Continued from page 26)

between messenger and cable at the splice location. The strip is of course removed when the splice is made. It will be necessary to cut the lashing wire at the splice point when the splice is made, and then re-lash by hand.

The cable sheath must be protected at points where the messenger has been spliced or wherever there is a chance for the sheath to be damaged due to a rough irregular surface. Protection is provided by placing a section of old cable sheath over the regular cable, as shown in Figure 9. The old sheath can be split so that it will fit over the cable requiring protection.

Another method of placing new cable that has been tried with fair success consists in feeding the cable directly off a reel which is carried on a truck. The cable is carried up to the messenger through a pipe fastened to the truck. Tension is controlled by a brake on the cable reel. This method makes it unnecessary to place the cable in temporary rings. The cable can also be fed directly off the reel and up to a cable guide which is attached to a handline and pulled ahead of the spinner, as shown in Figure 10.

Dead Ending the Lashing Wire

Considerable thought has been given to the most suitable method of dead ending the lashing wire. Some of the methods that have been tried and suggested are:

1. Dead ending under head of through bolts.

2. Carrying lashing wire continuous by using a compression type sleeve splice at pole and placing wire above suspension clamp.

3. Dead ending on a special clip placed next to suspension clamp.

4. Carrying wire by clamp and taking two wraps around cable and strand next to clamp. The end of the lashing wire extending in the opposite direction is carried under the clamp and then pigtailed to the first wire.

Some trouble has been experienced on one installation due to the special clips used slipping on the messenger, hence it would seem that this method will require an improved type clip. The writer favors the method whereby the lashing wire is carried continuous by means of a compression type sleeve splice at the pole.

At first thought it would seem that trouble would be experienced in the event the lashing wire pulled loose at the pole or broke somewhere in the span. This is not the case as actual tests have been made in which the lashing wire has been cut at various points in the span and the effect was to loosen only the one or two spirals next to the cut. The wire being soft and placed under tension, it does not tend to unwind as one would expect.

Fig. 12—Changing reels and splicing out lashing

UNINTERRUPTED SERVICE

with Non-Grounding Rare Gas Arresters

Used for many years by leading Railroads for vital Telephone, Telegraph and Signal Circuits.

Type MCD (illustrated) interchangeable with your present carbon block protectors.

Write for Catalog 39-A describing
Arresters Anti-Noise Relays
Terminal Strips Potheads Housings

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.
Signal Circuit Engineers Since 1906

Fig. 11 — Protection of cable by means of split molding which is lashed in place by spinner.

Other interesting views of the operation of the machine are: Figure 11 which shows how split wooden molding is lashed around cable to protect against tree damage.

Figure 12 which shows a new reel of wire being installed, and the type splice made. Figure 13 shows a close up view of the spinner head.

Figure 14—Spinning in a new 50 pair cable which replaces a 25 pair which has been taken oue of the rings and temporarily suspended by marlin.

END

Fig. 13—Close-up view of spinner head.

Telephone Company Assists in "Sham" Battle

Two new innovations involving different forms of communications in directing military maneuvers were utilized with great success March 26 by the Fifty-seventh Infantry Brigade Staff, commanded by Colonel Charles E. McCarthy.

In a "sham" battle which was being held at Fort Dix, N. J., a borrowed amplifying system belonging to the Forty-fourth Signal Company was used to broadcast instructions from a moving truck and proved invaluable, according to the commanding Colonel. Also for the first time in the history of the division, arrangements had been made with a commercial telephone company, the New Jersey Bell, to utilize their lines for use with the field telephone system during division maneuvers.

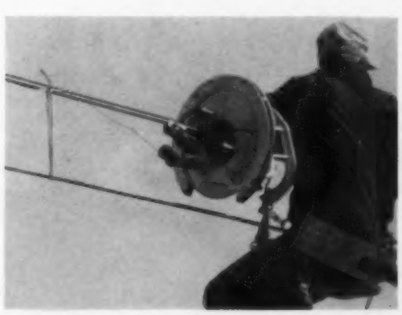

Fig. 14 — Spinning in a new 50 pair cable to replace an existing 25 pair which is temporarily suspended by Marlin ties.

CEDAR POLES

NORTHERN WHITE
WESTERN RED
PLAIN or TREATED

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DIRECT
from woods to you

It pays to get our prices.

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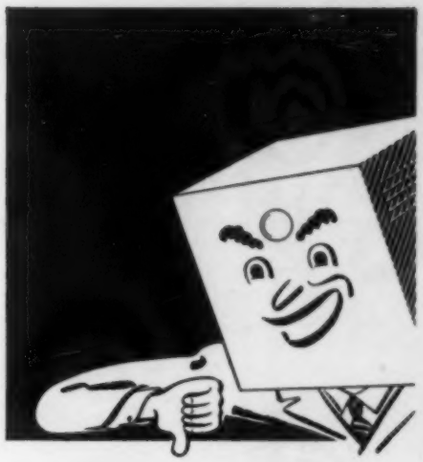
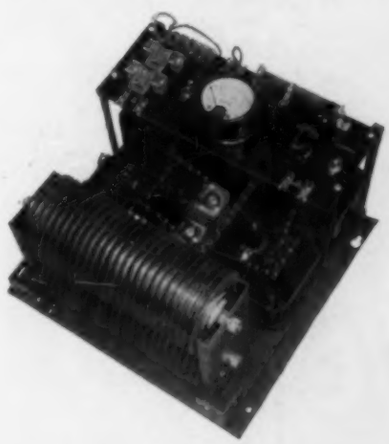


Put an end to the operating troubles caused by under and overcharging batteries. Raytheon RectiChargeRs follow the load, keep batteries properly charged, prevent frying transmitters, sticking relays and incorrect ringing. Lamp and battery life are increased.



A RectiChargeR with a small storage battery floating across its terminals makes a complete, automatic, AC-DC constant-voltage telephone power unit. Components are long-lived, maintenance-free. Consult your usual source of telephone supplies for the correct RectiChargeR for your needs. Write for bulletin DL-48-263ATE.

RAYTHEON MANUFACTURING CO.
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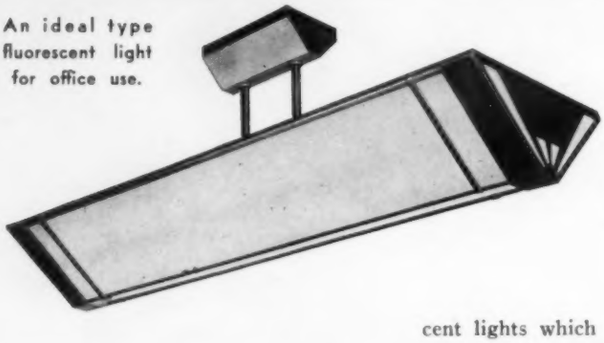
Communication & Electronic Developments



An ideal type fluorescent light for office use.

Fluorescent Lighting for Telephone Offices

Many industrial concerns, business houses, and even private homes are installing the relatively new **fluorescent lighting**. Even in the telephone field some companies are replacing incandescent lights in operating rooms and business offices with fluorescent units.

To those who are confronted with the question "can fluorescent lights improve my lighting situation" a general statement of what can be expected from Fluorescent lights may prove helpful.

In general, fluorescent lighting differs from incandescent lighting in power efficiency, color rendition, and light distribution. The big talking point for the new lighting is economy in operating cost. It is estimated that for the same amount of light that fluorescent units will consume one-half the power of incandescent lights. Where power rates are high it is possible to replace existing fixtures and lamps with Fluorescent lighting and pay for the new fixtures out of power savings over a relatively short period.

In operating rooms experimental installations of fluorescent lights have shown that because of their wide distribution area they provide more effective, shadowless lighting on the face of the switchboard. Correct color rendition is of no particular advantage in a telephone office, hence, we can conclude that we must be influenced mainly by considerations of operating economy, appearance, and light distribution in deciding on a fluorescent lighting installation.

There will appear in an early issue of Telephone Engineer a complete article which will explain the circuits, life, and other pertinent data on fluorescent lights which should prove helpful to telephone companies who contemplate the installation of fluorescent units.

New R. E. A. Carrier Device

A recent R.E.A. press release announces a new trouble locating device which is interesting to telephone men only because of some of the interferences in the press release itself. The new device was developed to detect and locate what are known as "line outages." A rural line network is divided into sections, and each section has associated with it a carrier current sending device which sends a signal into headquarters when the power current is interrupted. The following excerpts from the press release indicate at least an interest in the communication possibilities of the rural power lines that cover the country:

"At Bowling Green, Virginia, a group of R.E.A. officials recently watched a revolutionary new device by two young R.E.A. engineers pass its final tests with flying colors. In addition to the automatic recording feature of the new device, the research by which this equipment was developed has a rather unexpected by-product, which may become even more valuable than the outage reporting equipment. The same current which operates the outage device permits one way communication between headquarters and maintenance crews in the field and two-way communication appears possible. This result is possible by use of the power lines as telephone circuits with radio broadcasting effects on a portable receiver within a few rods of the lines. Engineers in private industry have worked on this problem for years but developed nothing that could be produced and installed at a low cost."

It has been repeatedly suggested that some day telephone service might be rendered to rural subscribers over rural power lines using the carrier current principle. Periodically rumors crop up that the R.E.A. have developed and will soon put into use rural telephone systems that will operate over their rural distribution networks. Most of these rumors originate from the prolific writings of Sunday supplement columnists or from the predictions of some wishful thinking R.E.A. project manager. The following quotation from the Daily Oklahoman illustrates a typical source of these R.E.A. telephone system rumors—

"Telephone lines also have been a headache to the growing company. The high voltage power lines caused so much static on the rural phone lines that it was impossible to hear. Suits resulted, and farmers who preferred the telephone to electricity protested. To end this argument the cooperative found it necessary to move or pay for the moving of all telephone lines where the two would not interfere.

'I understand they've got that whipped though' Nightengale said, 'One of the representatives from Washington says they have a telephone perfected which can be plugged into any light socket and the message and power travel over the same cable.

To obtain a number, the subscriber dials, and this sets up a wave length tuned only to the telephone dialed. In case a subscriber wants someone not on the power lines, he goes thru the central office as he does now.'"

A consideration of the technical facts as we see them might help to quiet the apprehension of telephone men who fear that they may soon be in competition with R.E.A. telephone systems.

In the first place there is not now available a practical carrier system that could be applied to an extensive rural power network and which would permit one subscriber to talk to any other as is done over a wire telephone system.

It is true that General Electric and other companies do manufacture carrier systems that can be applied to high voltage transmission lines and which are even equipped with dials so that a limited number of specific telephones can be signaled. Such systems however

are quite expensive and not applicable in their present form as a substitute for the ordinary wire system.

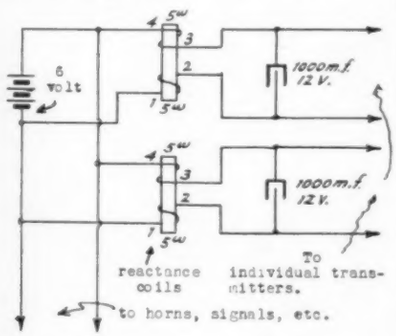
The application of the carrier telephone principle to a rural power network is complicated by the multiplicity of transformers bridged across the power line which tend to shunt out the carrier currents unless special chokes are installed, and by the need for accurately controlled oscillators at each sending station. The natural resonant frequency of a section of power line may be such that it absorbs an undue portion of the carrier current transmitted over it and this creates another problem.

Terminal apparatus for each telephone of any conceivable system would necessarily be fairly expensive as it would require several vacuum tubes, transformers, etc.

While it is a relatively simple matter to cook up a carrier system that will enable a two-way demonstration of the carrier principle applied to a power line, it is a horse of another color to design a practical and commercially practical carrier telephone system that will supplant existing wire systems. For the time being the telephone industry is not likely to soon have a competitor in the rural telephone field.

Novel Battery Feed Arrangement

We are indebted to **Leo L. Creighton** of San Mateo, California for a sketch and information on a novel battery feed arrangement that he uses.



Where from 2 to 10 magneto phones telephones are located close together in the same building, instead of using separate sets of batteries for each telephone, he utilizes a 6 volt storage battery with trickle charger connected in a circuit as shown in Figure 1. It will be noted that the battery current is fed through two reactance coils to each of the several transmitters. A 1000 m.f. 12 volt electrolytic condenser is shunted across each battery feed circuit to improve transmission and minimize any possibility of cross talk. The 6 volt storage battery is also used as a current source for horns or relays that may be required.

ACCIDENT QUIZ CONTEST

THE DRIVE on accidents continues. A unique plan recently inaugurated by F. E. Behm, General Plant Superintendent of The Lincoln Telephone & Telegraph Company, Lincoln, Nebraska, has been very effective in focusing attention on the causes of accidents.

The plan consists of issuing a monthly mimeograph bulletin which describes an actual accident taken from the Company's files. Employes are encouraged to submit a written opinion of not more than 200 words giving their opinion of how such accidents can be avoided. All papers received are judged by a committee and the one selected as best is awarded a cash prize of $5.00. A second and third prize of $3.00 and $2.00 is also awarded.

The monthly bulletin, in addition to carrying a description of the "Quiz Accident," also lists the rules of the contest and provides space for the contestant's story. For the benefit of those companies that might desire to try out this effective means of reducing accidents by focusing attention on their causes, a reproduction of a typical monthly bulletin with the prize winning answer is shown below:

ACCIDENT QUIZ CONTEST
$10.00
IN CASH PRIZES AWARDED EACH MONTH
$5.00-1st PRIZE--$3.00-2nd PRIZE--$2.00--3rd PRIZE

FOR THE BEST WRITTEN OPINION IN 200 WORDS OR LESS, AND WHICH GIVES THE MOST PRACTICAL ANSWERS TO THE FOLLOWING QUESTIONS WHICH CONCERN THE ACCIDENT OUTLINED BELOW.

1- WHO OR WHAT WAS AT FAULT?

2- HOW COULD IT HAVE BEEN AVOIDED?

3- WHAT STEPS SHOULD BE TAKEN TO PREVENT A REPETITION?

WRITE YOUR ANSWERS IN THE SPACE BELOW, FOLD, AND DROP IT IN THE COMPANY MAIL BASKET.

ACCIDENT QUIZ CONTEST ENTRY

DESCRIPTION OF ACCIDENT FOLLOWS:-

"A" and "B" were engaged in transferring wire on poles adjacent to a hedge. Both men had occasion to walk through an opening in the hedge.

"A" was walking ahead of "B". A hedge thorn struck "A" on the leg, causing him to step back quickly, "B", who was following closely, stepped on "A's" foot inflicting gaff wound.

WRITE YOUR ANSWER IN THE SPACE BELOW

1. "B" was at fault for following too close to "A" when they were wearing their climbers. Partial fault can also be laid to both "A" and "B" for not being sure they had a proper opening to go through the hedge.

2. By "B" waiting to go through the hedge until "A" was on the other side and by making an ample opening for going back and forth.

3. By constant instruction and cautioning regarding working around hedges and regarding using proper precaution when wearing climbers.

CONTESTANT'S NAME W. M. Mouden

Reduce Costs OF TEMPORARY INSTALLATIONS WITH KEARNEY NO-RENCH SCREW ANCHORS

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. The Mark of Quality Products

TELEPHONE ACCESSORIES for BETTER LINE CONSTRUCTION and MAINTENANCE

Provides inexpensive guying of bracket or single phase ridge pin lines.

TIME and again temporary guying is demanded. Immediately, the operating man must think in terms of cost and time. Kearney No-Rench screw anchors, made of Certified Specification Malleable Iron, are 100% salvageable, because the rod and helix are one unit and may be screwed in or out of the ground conveniently.

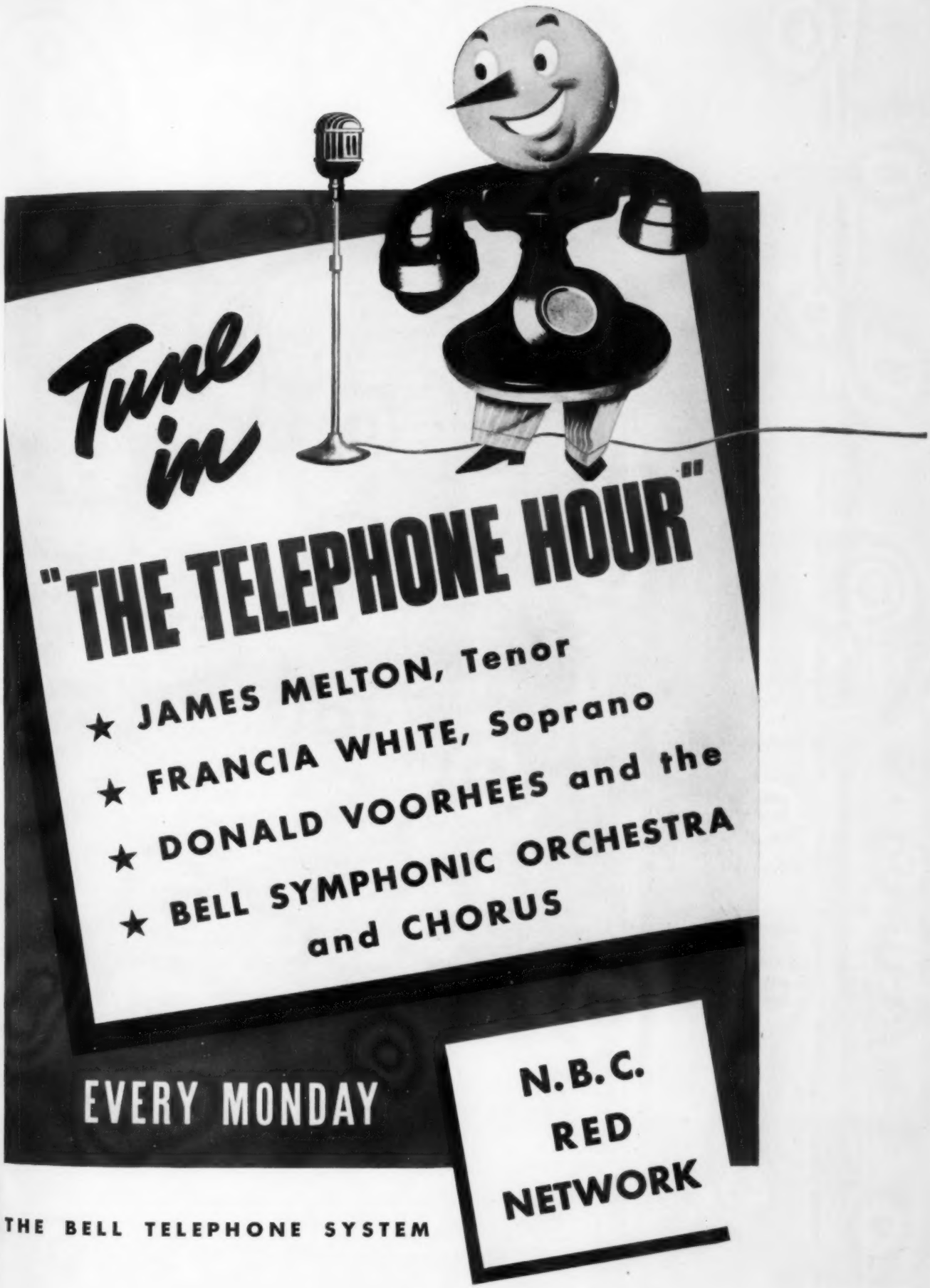
They are efficient for permanent guying, too, having holding powers from 2,000 lbs. to 13,000 lbs., depending on the anchor size. Ideal for permanent anchorage where lawns or flowerbeds prohibit hole-digging.

Radio helps make friends for the *Telephone*

Almost a year ago, the air waves of radio greeted a new program—"The Telephone Hour." Today, an average of about eleven million people each week listen to its music and short announcements about various phases of the telephone business.

Tune in "The Telephone Hour" each Monday night at eight o'clock, E.S.T. We believe you will enjoy it. As you listen, notice how radio offers another means of informing people about the telephone service of this country. These friendly messages should benefit the whole telephone industry.

AN ADVERTISEMENT OF


Tune in
"THE TELEPHONE HOUR"
★ JAMES MELTON, Tenor
★ FRANCIA WHITE, Soprano
★ DONALD VOORHEES and the
★ BELL SYMPHONIC ORCHESTRA
and CHORUS
EVERY MONDAY
N.B.C.
RED
NETWORK
THE BELL TELEPHONE SYSTEM

MAKE LINE TESTS *Quickly*

WITH THIS WIRE CHIEF'S TEST UNIT

This magneto test unit is indispensable for keeping lines up to peak performance. It aids in minimizing subscriber complaints by enabling corrective measures to be taken at once. In addition, you can use it for testing telephones, ringers, generators, and other similar parts.

The set contains five lever keys and one especially designed Weston voltmeter which has two scales (0-6 and 0-150) and a special scales showing resistance in ohms. Write for prices and details.

Distributors in U. S. and Possessions:
AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 West Van Buren Street, Chicago, U.S.A.

AUTOMATIC ELECTRIC
TELEPHONE SIGNALING AND COMMUNICATION APPARATUS

Rehabilitation of the Run Down Plant

(Continued from page 22)

proved during the past few years and cable hung a number of years ago with early type rings may often be given a new lease on life by replacing the old type rings with modern well designed rings.

Where examination reveals in certain sections of cable the tendency for ring cutting at poles, particularly on cable leads which are in an exposed location with a resulting wind vibration, some of the several well designed cable ring saddles or special wide contact surface rings should be placed to protect the sheath on each side of the pole. A typical cable ring saddle which is fine for preventing sheath damage is shown in Fig. 7.

Other Sources of Sheath Damage

WHERE severe ring cutting or crystalization has occurred and is revealed by inspection some form of repair should be made. In many cases the arc welding method of repair will give good results. A temporary repair which will prevent moisture entering the cable until more permanent repairs can be made consists of winding two layers of friction tape over the affected area and painting the tape with a good grade of asphaltic paint. Such repairs will last for several years without attention. Particular attention should be paid to cable terminal legs to insure that they are properly cleated to the pole and that the cleats are not placed in such a way as to result in eventual damage to the sheath itself. Figure 8 shows how cable terminal legs should be attached to the pole. Sleeves, particularly those of the larger size cable should be well supported. While a sleeve can be properly supported using lashing wire ties, this requires a certain amount of skill and is made unnecessary by the modern sleeve support.

Considerable trouble occurs in aerial cable sheath at corners and at junctions. This is due in some cases to excessive sag which results in the cable creeping away from the corner, thus placing it under tension and causing either bad ring cuts or the cable sheath breaking at the junction. This can be avoided by proper support at these corners and by avoiding excessive sag. A well arranged aerial cable turn and junction is shown in Fig. 7-A.

Here again the well designed supports available for such locations should be used.

Fig. 8—Good construction at terminal pole.

Where cable is on a substantial grade there should be an improved type of grade clamp at the pole near the top of the grade and about every second or third pole on the grade. The best cable will last only a relatively short time if tree limbs are allowed to vibrate the cable sheath in the ring. Where it is impossible to keep the trees trimmed away from the messenger or cable, the cable should be encased in wooden moulding which is available thru supply houses for this purpose.

Protection Against Lightning and Power Lines

AT JUNCTIONS of open wire and cable if the open wire is more than one-half mile in length, either a protected type terminal or an unprotected terminal with pole type open space cutouts should be provided to protect the cable against insulation breakdown or burnout due to excessive voltages from lightning or as the result of a contact with a power line.

If lightning protection is to be complete it is important **to connect the open space cutout ground terminal to the cable sheath as well as to earth.** Failure to connect the protector ground

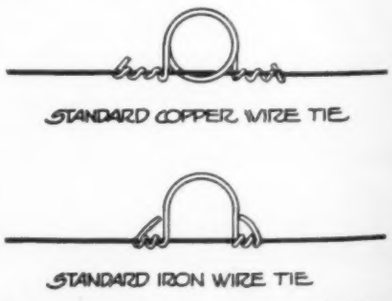


Fig. 9—Standard iron and copper wire ties.

"In CLEVELAND *I'll Stay at* HOTEL COLONIAL *In the heart of Telephone Land."*

Just across the way from Hotel Colonial are the two skyscrapers devoted to the telephone and its business, the Ohio Bell Bldg. on Huron Rd. and the Electric Bldg. on Prospect Ave.

This fine "small hotel in the midst of the big hotels" offers reasonable rates, starting at $2.00 single with bath, excellent food, and every hotel facility. Clean, comfortable, well furnished rooms and a

Delightful Grill-Bar

•

HOTEL COLONIAL

R. M. (Duffy) Lewis, Manager

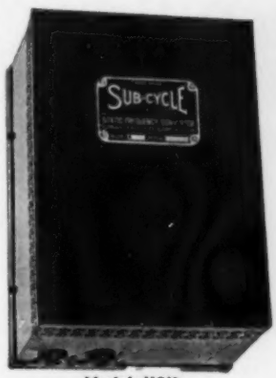
Prospect at E. Sixth St. Cleveland, O.

POWER AND ECONOMY

THERE IS NOW A

SUB-CYCLE

For Every Service Demand



Model "S"

PRICE $45.00

Designed for offices up to 1600 stations.

Six Models to Match Ringing Loads Ranging from the Small PBX to the Large 4000-Station Central Office.

Prices $32.00 to $93.50

Also Pulsators

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No Moving Parts

Nothing to Adjust

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The MODERN Method of Ringing

Exclusive Features *Write for literature.*

LORAIN PRODUCTS CORPORATION

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Sold by Leading Distributors

ACCURATE PERMANENT TOLL TIME RECORDS!

A Type for Every Different Central Office Set-up

SPECIFICATIONS
Model 33

COMPACT: 7½" x 3⅜" — Fits into space occupied by only 4 Type A Keys. **WEIGHT:** 8 pounds.

UNOBSTRUCTED VIEW—Full vision of dial from any position on the switchboard.

SWEEP SECOND HAND — Tells the end of the initial period at a glance.

Model 33

CALCULAGRAPH COMPANY

Main Office and Plant:

308 SUSSEX STREET HARRISON, N. J.

CALCULAGRAPH

Accurate Toll Timing to the Second!

Fig. 10—Tools for use in making compression type splices.

terminal to the cable sheath will greatly reduce the efficiency of the protector against lightning charges. Protected cable terminals of course do have the ground strip connected to the sheath by virtue of the cable sheath being connected directly to the cable terminal itself. In order to provide full protection against possible high voltage hazards to linemen, fused protected cable terminals equipped with only a single set of open space cutouts shall have an auxiliary protector mounted on the pole and connected to the line side of the fuses. This serves to provide a path to ground in the event of a cross between a high voltage power and telephone line even though the protector fuse is blown.

Beauty–Performance

That's . . . . .

The Suttlephone

Usually a person thinks of a telephone only as a means of communication, not realizing the fact that, to the housewife, it is also a part of the furnishings of the home.

Suttle has realized that fact and has combined beauty as well as excellent performance in the Suttlephone.

See new catalog No. 55

Suttle Equipment Co.

LAWRENCEVILLE, ILLINOIS

Cable terminals are now available which are equipped with open space cutouts on both the line and cable side and with this type of terminal it is of course not necessary to use the auxiliary open space cutouts.

Overhauling Open Wire

POORLY maintained open wire will inevitably result in frequent cases of trouble and consequent service interruptions as well as poor transmission. Where the existing wire is in usable condition the repair work will involve the removal of bad splices and proper adjustment of sag and the trimming of trees which may be in contact with the wire. Attention should also be given to possible high resistance connections at points at which jumpers may be connected to the open wire, as for instance, at (1) cable-open wire junctions, (2) at points in the line where repeating coils may be installed, (3) at subscriber drop take-offs, (4) at underground railroad crossings, and other similar points. In overhauling an open wire line it is generally a good idea to burnish the line wire and remake all jumper connections using an improved type of test connector to insure that there is good contact between the line wire and the jumper. It is virtually impossible to get a good connection by simply wrapping the jumper wire around the line wire. The correct sag for open wire will depend on the temperature and length of span.

Sag at 70° will vary from about 7 inches for 100 foot spans up to 26 inches for 200 foot spans. For higher temperatures the sag should be increased roughly 10% to 12% for each 10 degrees increase in temperature and at lower temperatures the sag shall be reduced approximately the same amount. Open wire should be securely tied to the insulator using a standard tie. The ties in general use in this country for iron and copper wire are illustrated in Fig. 9. One of the important features of open wire maintenance is the making of good low resistance splices. The modern trend is entirely toward the use of the compression type sleeve. A well designed tool for applying the compression type sleeve is shown in Fig. 10. These tools are a good investment for any company.

Transposition Requirements for Open Wire

EXTENSIVE networks of rural power lines makes transpositions in both rural and toll lines necessary if inductive interference is to be kept at a minimum. The simplest transposition scheme for two wire lines is to place transpositions at the quarter and three quarter points in each mile. This will give an effective balance against the power line which extends through the mile. Where two metallic circuits are involved one circuit should be transposed at the quarter and three quarter mile points and the other at the half mile point in each mile. This results in a good balance to paralleling power lines on the part of both telephone circuits and at the same time minimizes cross talk between the two telephone circuits. For rural circuits up to and including 10 wires the transposition scheme shown in Fig. 11 will give good cross talk as well as inductive interference balance. Transpositions can be readily installed using compression type sleeves without the necessity of splicing out line wires. They may be made either on transposition drop brackets or by the somewhat cheaper and not quite as satisfactory method of using a two piece glass and a 9 inch pin. Both methods are illustrated in Fig. 12.

Where it is necessary to replace existing iron wire because of corrosion some thought should be given to the new small diameter Copperweld wire which has the same electrical characteristics as 109 iron and virtually the same mechanical strength, but consists of copper with a steel core. It is of course much lighter in weight than 109 iron which makes it somewhat easier to handle and it is of course free from

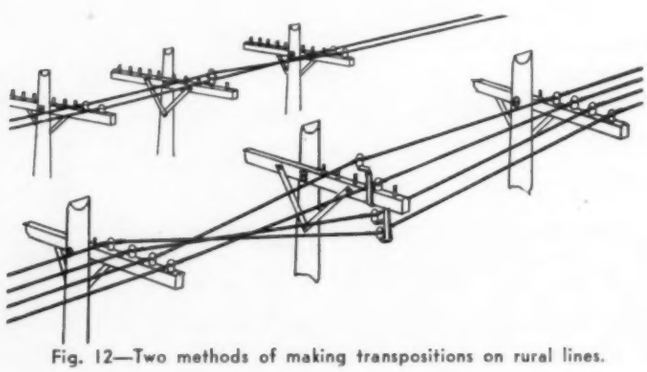


Fig. 12—Two methods of making transpositions on rural lines.

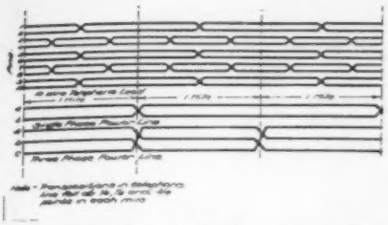


Fig. 11—Simple yet effective transposition scheme.

corrosion effects. Sufficient experience has as yet not been had to determine just what disadvantages, if any, can be charged against it. The new high strength steel wires offer interesting possibilities for long span construction, as well as extra strength for regular spans.

The Drop Wire Plant

DROP WIRE is perhaps the most perishable of the various types of outdoor plant. If properly installed and maintained, however, it will give many years of useful life. If improperly installed and particularly where not given proper sag and tree clearance, it will be short lived and will be a source of constant trouble. The well designed drop wire supports now available will avoid damage due to improper ties on drop wire. The low cost of these items makes them a "must item" in every exchange. The improved types of pole and house brackets and other drop wire accessories makes it possible to install drops quickly and in a manner that insures long life. Where connected to open wire drop, the connection should always be made by a test connector and not by wrapping the drop wire around the line wire as this is a prolific source of poor transmission. House runs should be neat and uniform. Where it is impossible to avoid placing drops thru trees, the drops can be protected either with tree loom or with special tree wire. A neat and serviceable drop wire installation is shown in Fig. 13.

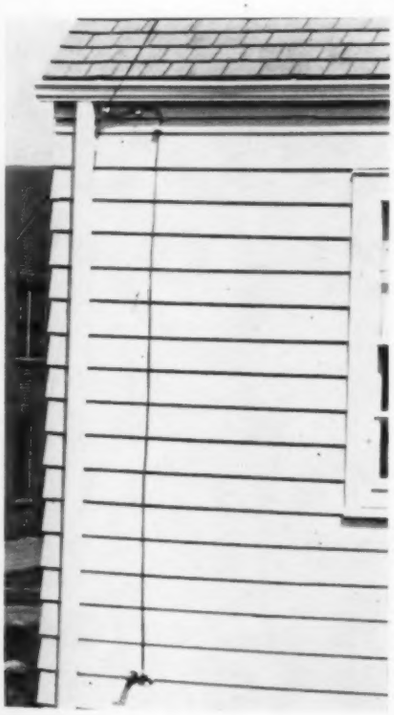
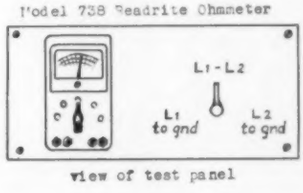


Fig. 13 — Neat and serviceable drop wire installations.

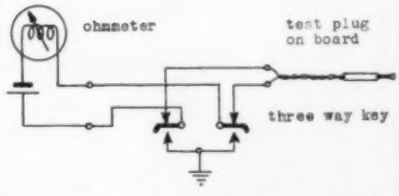
END

Convenient Testing Arrangement

We are grateful to Paul Grauer, Manager of the Campbell Telephone Company of Campbell, Nebraska, for a description of a special test arrangement which he has made up and mounted on his Stromberg-Carlson Model 105 magneto switchboard. Using a Beede Model 701 0-50,000 ohm ohmmeter and a three way switching key, he connected the combination so that the meter terminated on a switchboard cord and plug which could be inserted in any line jack for testing purposes. The three position key enables tests to be made from either side of the line to ground or across the line. Being accessible to the operator, tests can be made from out on the line to the switchboard with the assistance of the operator.

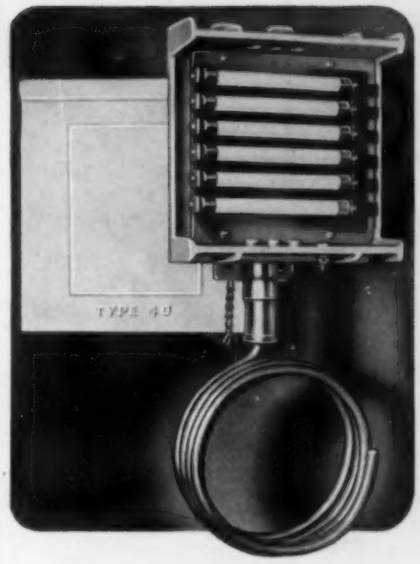


view of test panel



The test unit was mounted on the upper right hand corner of the switchboard. Companies that are interested in applying this scheme should take advantage of the economically priced multi-range testers now available and which can readily be removed from their cases and mounted at some convenient point on the switchboard, and wired to a three position switch. The circuit of the testing arrangement suggested by Mr. Grauer is shown in Fig. 1.

Where it is undesirable to mount the test cord and plug on the key shelf, a cord which is terminated with a plug at both ends can be used in conjunction with a jack on the test panel.



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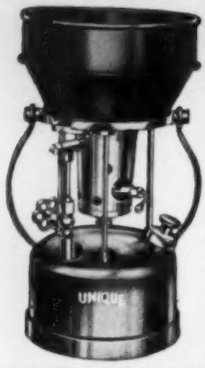

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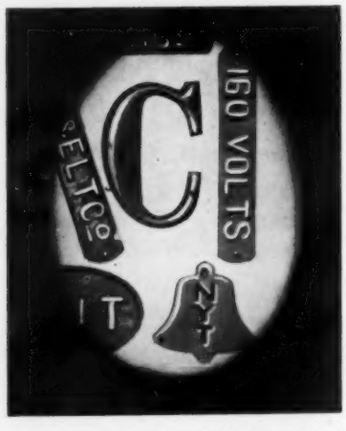

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Selection and Ordering of Lead-Covered Telephone Cable

(Continued from page 30)

be used is willing to guarantee the satisfactory operation of the office over higher maximum loop resistances. If 635 ohms be accepted as the maximum allowable normal circuit loop resistance exclusive of substation equipment and interior wire the selection of the conductor gauge in the new cable may be based upon the following table:

In other words if the length of the subscribers loop does not exceed the number of feet shown in the table as the equivalent of 635 ohms for any given gauge of copper wire conductors then cable having conductors of that gauge may safely be employed **insofar as the resistance of the subscribers' loops is concerned.** It may be noted that the use of cable with extremely small gauge conductors, unless in cables having very large numbers of pairs, is not common. Cable having conductors of 24 gauge B. & S. may be used in aerial construction with confidence however **provided all other factors** are adequately met. The advantage, of course, in the use of cable with small gauge copper conductors rather than large is due to the economy effected in the cost of cable, the reduction in freight and the lower cost of installing. It is the author's considered opinion, however, that the splicing costs for labor per 1,000 feet of cable having any given number of pairs are about the same, when the same methods are used, for all conductor gauges between 19 B. & S. and 26 B. & S. inclusive. This opinion is subject to some controversy between qualified authorities. Because cable with smaller gauge conductors is lighter in weight than cable having the same number of pairs of larger gauge there is an additional economy due to its use because the supporting structure is not called upon to sustain so great weight. In general completed cable with conductors of smaller gauge will not cost as much in the plant as similar cable with conductors of larger gauge.

Transmission Requirements

THE OHMIC resistance of the copper wire conductors in any cable has, of course, an important effect on transmission. It is true, however, that the factors which limit the resistance of the cable because of a maximum allowable loop resistance in the subscriber's circuit are limiting factors for **signalling reasons** rather than for transmission reasons. In other words it is possible, with modern manual common battery or dial equipment, to talk over a loop having a higher resistance than will be satisfactory from the signalling standpoint.

A property of the pair of conductors in cable which is especially destructive to transmission is the total capacitance between the two wires of the pair. To the average telephone executive familiarity with the transmission qualities of open wire may lead to the inadvertent acceptance of cable specifications which cannot possibly assure satisfactory transmission after the cable has been installed.

In order to be conservative, the specifications covering any lead-covered telephone cable should limit the **Mutual Capacitance** (one wire against its mate with all other conductors grounded) to not more than 0.095 microfarads per mile of cable measured by the 800 cycle alternating current method. This requirement may possibly be questioned by the supplier who is asked to bid, but it should be insisted upon and later, when the purchase order for the cable is placed, should be clearly inserted in the wording of the order. Another standard is often used in describing cable but only **Mutual Capacitance** per average pair per mile, measured by the 800 cycle A. C. method is safe. This can always be determined for any given length of cable intended for telephone service. Roughly it is important that both the loop resistance per mile per pair and the capacitance between the two wires of the pair be kept at the lowest practicable point all things considered.

NOTICE

Readers will notice in some of the articles contained in this issue that a number of manufacturers products are shown.

We will be indeed glad to refer you to these various manufacturers if you will address your inquiry to the Editor of TELEPHONE ENGINEER.

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2. **OUTSIDE PLANT ECONOMY.** These high-tensile strength wires, since they make possible longer spans, keep investment in outside plant at a minimum. Construction costs are lower, and material requirements are reduced accordingly.

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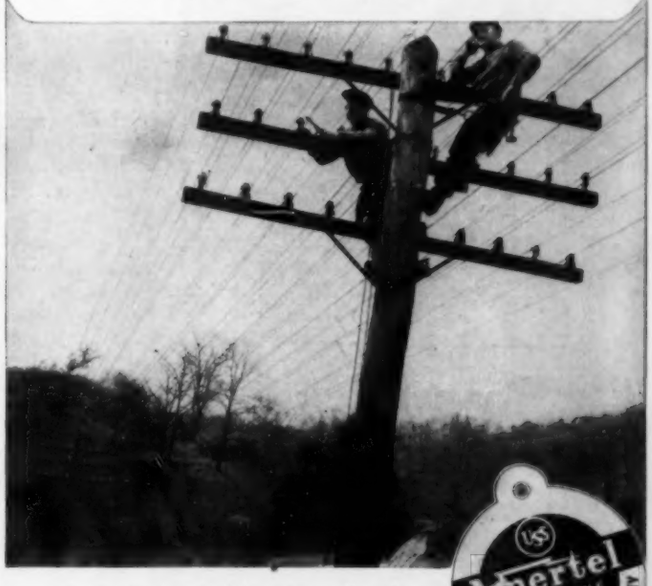

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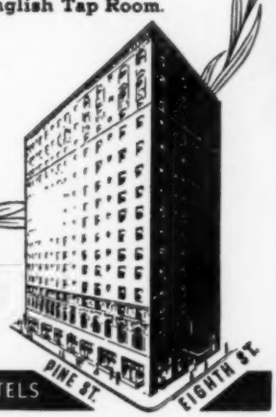

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Convention Reports

(Continued from page 32)

KANSAS

IT WAS different. The Kansas 41st Annual Convention was filled with new interest. The attendance was the largest in many years during the two-day meeting, March 27 and 28 at the Jayhawk Hotel, Topeka.

The eighth annual golf contest preceded the convention where the usual number closed the day with a dinner and distribution of prizes.

Members of the executive committee re-elected are: Fred Scoresby, Sterling; J. A. Gustafson, Kansas City; Fred Cross, Wilson and Samuel Tucker, Pleasanton.

At the meeting of the executive committee, after the convention closed all officers were re-elected as follows: President, Samuel Tucker of Pleasanton; Vice-President, Walter Pedigo of Pratt; Treasurer, Estella Henderson of Pleasanton and Secretary, H. B. Couch of Topeka.

Walter Pedigo, presiding, opened the convention with a few remarks of welcome and introduced President Samuel Tucker who gave his 17th annual address.

H. B. Whatley, Toll Traffic Supervisor, Southwestern Bell Telephone Company, Kansas City, conducted the operators' conference which included owners and other employees as well. He was assisted by Miss Elsie Fairbanks of Topeka.

The Annual dinner was held on the roof garden of the Jayhawk Hotel where gaity and good will prevailed. The Queen, Phyllis Koch, with the Golden Voice was announced, ushered to the throne provided at the head table and presented with a trophy from the Association by Fred Cross.

H. B. Couch was again re-elected secretary of the Kansas Telephone Association during its 1941 convention.

"The Backstage of Telephone Research" was presented following the dinner by Nelson Finks of the Southwestern Bell Telephone Company, a stage show of laboratory development revealing the progress of telephony. It has been given before many civic clubs in Kansas during the past year. Dancing completed the evening entertainment.

Louis Pitcher, Executive Vice-President of the United States Independent Telephone Association opened the Friday morning session with facts regarding national affairs.

D. J. Neale of the Neale Mfg. Co., gave a very interesting discourse on cable suspension by spinning the cable to the messenger. A movie illustrated the use of a spinning machine. Many questions were asked by owners and linemen regarding the advantages of this type of construction. (*An article on this device is carried in this issue.—Ed.*)

A group at the Kansas Telephone Association banquet. In the background can be seen Phyllis Kock, the queen sitting in front of her throne, with Mr. Louis Pitcher, Mrs. Pitcher, Mrs. Tucker, Samuel Tucker who is President of the Association for the 16th time, and H. B. Couch on her left. At the extreme right is V. E. Code, general manager of Central Kansas Telephone Co.

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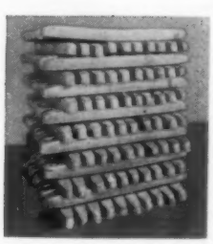
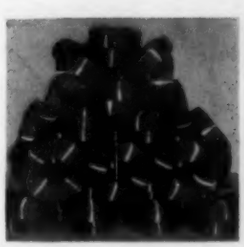


FROM COPPER BAR TO FINISHED WIRE



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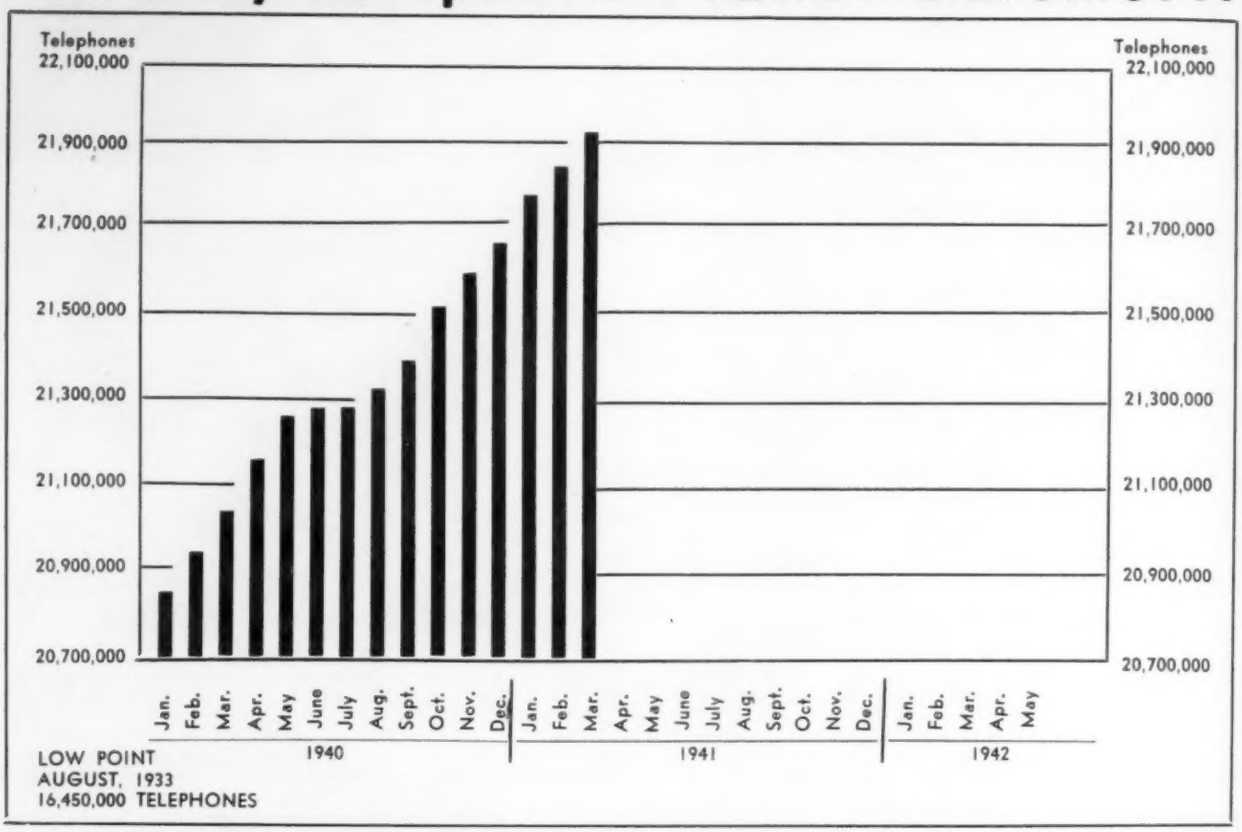

TELEPHONE ENGINEER *Handbook Tables*

by B. C. Burden

File—Testboard Data
Date—April 15, 1941

Subject: *Cable Data for Fault Location Use*

GENERAL

In the location of faults in telephone cables by means of the Wheatstone Bridge or in some cases by means of the ohmmeter, it is necessary to convert Resistance to Fault Readings into Feet to Fault. The following table gives the number of feet per ohm for the five cable gauges ordinarily encountered in telephone work. Example of table use: A bridge measurement shows an office to fault reading of 40 ohms. The cable is 22 gauge and the temperature 70°. The distance to the fault will therefore be: 40×61.68=2467 feet.

COMPENSATION FOR TWIST

It is customary to subtract from 1 to 2% from tabular values to compensate for twist and spiral adding to overall resistance. To illustrate in the above example assume we are dealing with a small cable and we therefore apply only a 1% correction. Our actual distance to fault would be 2443 feet.

FEET PER OHM DATA FOR TELEPHONE CABLE

Temp. (F)	26 ga.	24 ga.	22 ga.	19 ga.	16 ga.
35°	26.26	41.76	66.41	133.14	266.91
40°	25.99	41.34	65.73	131.78	264.20
45°	25.73	40.91	65.06	130.43	261.48
50°	25.46	40.49	64.38	129.07	258.77
55°	25.19	40.06	63.71	127.72	256.06
60°	24.93	39.64	63.03	126.37	253.34
65°	24.66	39.21	62.36	125.01	250.63
70°	24.39	38.79	61.68	123.66	247.92
75°	24.13	38.37	61.01	122.30	245.20
80°	23.85	37.94	60.33	120.95	242.49
85°	23.59	37.52	59.65	119.60	239.77
90°	23.33	37.09	58.98	118.24	237.06
95°	23.06	36.67	58.30	116.89	234.34
100°	22.79	36.24	57.62	115.54	231.63

* All values are for straight wire in large cables and actual resistance of a cable pair would be greater per unit length.

Wire Chief's Course

(Continued from page 36)

Fig. 2—Miscellaneous Linesman's Tools.

lineman must be equipped with two pair of splicing clamps or sleeve twisters as they are sometimes called. Where the compression type single tube sleeve is being used in preference to the double tube sleeve, the lineman should be equipped with a suitable compression tool for making this type of splice.

Compression splices are far superior to the old double tube type and should become standard practice in every exchange.

Another hand tool that is essential to the lineman is a braid stripper for use in removing the braid coming from the parallel drop wire. Other "must have" tools for line work are a good hand axe, a lineman's wrench (also known as lag wrench) for use on pole line hardware, a good carpenter's hammer, an electrician's knife, and a heavy screwdriver. In addition to the tools mentioned which the lineman usually carries on his safety belt, there should also be available on the truck other small tools such as a 2 inch (width) socket framing chisel, a good 10 inch sweep ratchet brace, an assortment of auger bits in the following sizes: Size 5/16", 3/8", 7/16", 1/2", 9/16", 5/8", 11/16". The 5/8" and 11/16" sizes should have a 12 inch twist; several assorted size screw drivers, 1 good hack saw, several files, one 26" cross cut hand saw, 100 feet linen tape, 1 quart gasoline blow torch, 2 soldering coppers, 1 tool belt and safety strap, climbers and straps, 1 standard canvas bucket, one two-man crosscut saw.

Each lineman should have his own pliers, hand axe, lag wrench, etc., however, the tools that have just been mentioned, other than those carried by the lineman, can serve several linemen.

Fig. 4—Pole Erection Tools.

It is false economy to get along without adequate tools. Some of the miscellaneous tools required by the lineman are shown in Figure 2.

Digging Tools

THE digging tools required for outside construction work will consist of an 8 foot straight handle digging shovel, a 8 ft. posthole spoon and a 4½ ft. round point short handle shovel. The straight handle shovel is of course used for digging the hole, the spoon for removing the dirt from deep holes and for difficult digging and the short handled shovel for back filling. It will be generally advisable to have at least two straight handled and two short handled shovels on even the lightest construction truck. In addition to the shovels a digging spud bar will be required for use in hard earth. An earth auger will be required for anchors, the 8 inch size being most popular. Figure 3 illustrates the required digging tools which should

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Fig. 7—Miscellaneous Construction Tools.

be standard equipment on every light construction truck.

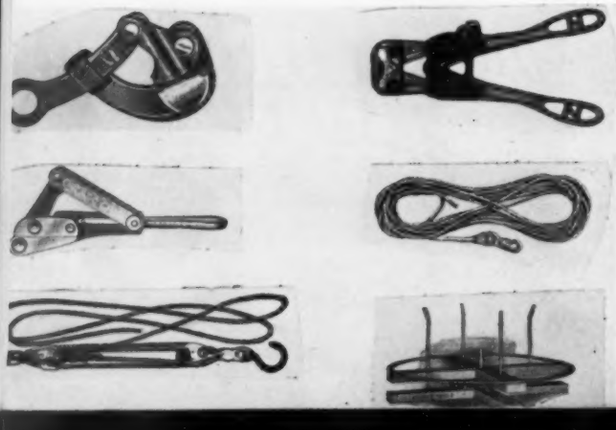
Pole Erection Tools

THE chief pole erection tools for the small exchange are two 12 foot pike poles, two 7 ft. tamps and a dead man or pole jenny. The pole jenny is needed only with the larger poles and ordinarily is not required for the smaller poles used in the average exchange. Figure 4 shows the pole erection tools needed.

Wire Handling Tools

THE chief tools required in the handling of line wires, messenger, and guy strand, in addition to the lineman's pliers and sleeve tool already mentioned, are: One or more sets of lineman's slack blocks fitted with ⅜" rope, several sets of wire grips for line wire and one set for messenger and guy strand, 50 feet of ⅜" hand line rope fitted with a round eye and snap hook on one end, and a combination payout and takeup reel. Representative wire handling tools are illustrated by Figure 5.

Fig. 5—Wire Handling Tools.



Cable Tools

CABLE work involves two distinct operations, namely **cable placing** and **cable splicing.** In cable placing work no special tools in addition to those already discussed are required with the exception of a pulling in sock which is used in pulling in the cable. Cable splicing, however, requires a number of additional and special tools namely, viz: one paraffin dipper, one cable dresser, one furnace, one pot hook, one shave hook, one large chipping knife, one solder ladle, one paraffin pan, one paraffin pot, one 6" solder pot, one cable saw, one pair of splicers scissors, one tarpaulin, one tone test unit, two head receivers, one wax thermometer, one splicer's platform, and one set of tag boards.

Cable splicing is a skilled type of work and will usually require someone who spends full time at this profession. Figure 6 illustrates the necessary cable tools.

Miscellaneous Construction Tools

IN ADDITION to the tools already mentioned, there are a number of other items that should be carried on the construction truck and which will improve the working efficiency of the construction forces. The principle extra items are: one 24 inch pair of bolt clippers, one 8 inch iron snatch box, one chain type hoist for use in pulling guys, one tree pruner, one cable car, one set of assorted coal chisels, one large ball pein hammer, one axe, one set of warning flags, one first aid kit, one canvas tool bag, one ladder capable of extension to 25 feet, one lineman's test set. These miscellaneous tools are illustrated in Figure 7.

Proper Care of Tools

IT IS important that tools be properly maintained, otherwise they become difficult to use and in some cases hazardous. Proper care embraces keeping the toops sharp and in good mechanical condition. Lineman's belt and safety strap, slack blocks, hammer and axe handles, handlines, etc., should all be inspected periodically to insure they have not been damaged or weakened in any way. Shovel handles can be kept from splintering by soaking in linseed oil occasionally. Tools are often damaged and some serious injuries have resulted from throwing sharp edged tools up to a lineman on a pole. This practice should be prohibited and tools should be elevated where necessary by means of canvas bucket and handline.

Fig. 6—Cable Tool Kit.

Construction and Service Trucks

THE small and medium size company has need for an automobile for two purposes, namely, first for construction work such as plant extension and maintenance of existing plant, and second for use in trouble shooting and station installation work. There is no longer a need for any company, regardless of size, to use makeshift maintenance and construction truck bodies, as well-designed, nominally priced bodies are now available. These bodies are arranged to carry all of the needed materials in neat compartments and greatly expedite work by keeping everything in shape and readily accessible. The practice of buying a truck equipped with an ordinary pickup body and then throwing tools and material in a haphazard pile is poor management and slows up the workman. Bodies are available to fit any size truck and for the smaller companies a one half or three-quarter ton truck is ample.

Standard Materials

IN ADDITION to an adequate set of good tools and a suitable construction-maintenance truck, an ample supply of standard telephone materials should be carried in the company storeroom and on the truck.

It is false economy for a Wire Chief or Plant Manager to skimp on materials as any savings that might result from the omission of some needed item is only temporary and will usually result in service impairment with the subse-

quent expense of locating and correcting a case of trouble. For example, many Plant Managers connect a drop wire to the line wire by merely giving it a few twists around the line wire. While such a connection may have negligible resistance at the time it is made, it will usually develop into a source of trouble later on. A few cents for a good test connector at junction of drop and open wire will prevent such trouble. Other similar cases of service impairment and plant damage resulting from failure to use the proper materials are:

1. Tree damage to drops due to leaving off protective loom.
2. Damage to cable as the result of not placing grade clamps and special rings at poles.
3. Leads blown over because of inadequate guying.

Space does not permit a complete listing of all items that should be carried in the storeroom but we have listed below the principal items. Those marked with a star should be carried regularly on the construction-maintenance truck, while the others need be carried on the truck only when it is known they will be needed in connection with a specific job.

WIRE

*Drop No. 17—Bronze, copperweld, or Ironite
*Inside No. 22—Soft copper - Twisted Pair
*Line No. 109—Galvanized iron
*Line No. 14-40—Copperweld wire
*Line No. 104—H. D. Copper (for toll lines)
Guy No. 203—Galvanized iron
Guy No. 2200 lb. - 3/16"—Galvanized Strand
Guy No. 6000 lb. - 5/16"—Galvanized Strand
*Ground No. 14—Rubber covered copper wire.

CROSSARMS, PINS, BRACKETS, AND ANCHORS

10 Pin—3¼" x 4¼" x 10' (for heavy toll leads)
10 Pin—2¾" x 3¾" x 102" (for light toll and farm)
6 Pin—2¾" x 3¾" x 62" (for light toll and farm)
4 Pin—2¾" x 3¾" x 42" (for light toll and farm)
*Wood Pin (locust) 1¼" x 8" - Standard
*Wood Pin (locust) 1¼" x 9" - for two piece transposition glass
*Insulators—No. 12, No. 16, No. 53
*Brackets (oak) 1½" x 2" x 12"
Anchors—assorted sizes with rods.

COMMON POLE LINE HARDWARE

*Through Bolts—⅝" diameter 8", 10" 12", 14" lengths
*Galvanized washers—⅛" x 2" x 2" (⅝" hole)
*Thimble - Eye Bolts (for guys) ⅝" x 10", 12" lengths
Crossarm braces 7/32" x 1 7/32" (20", 26", 30")
*Galvanized Carriage Bolts—⅜" x 4", ⅜" x 4½"
*Lag Screws—⅜" x 3" - ⅜" x 4", ½" x 4½"
*Guy Clamp—2 and 3 bolt
Guy Plates—2½" x 7" x 3/16"
*Galvanized Washers—½" x 1¼"
Guy Hooks—¼" x 1¼" x 3¼"
*Transposition Brackets for 2¾" x 3¾" arms
*Drive Hooks (to attach drop wire clamps to pole) 7/16" x 5"
*Span Clamps—to feed drop from cable messenger
*Grade Clamps—to hold cable on grades
Pole top extension Fixtures—for elevating drops above pole
*Nails for brackets—30 d and 60 d
*Nails for pins—6 d

WIRE FIXTURES

*Knobs for drop wire—type C, S, and T
*Porcelain Tubes—⅜" x 4" and 6" size
*Drop wire clips (for straight runs and drop wire)
*Drop wire clamps (for dead ending drop wire)
*House Hooks, 4" (for attachment to building)
*Bridle rings (for drop wire runs on buildings)
*Masonry anchors or hooks (for attaching wire to masonry buildings)
*Test connectors (for connecting drop wires to open wires)
*Insulated nails and staples (for inside wire use)
*Splicing Sleeves (single or double tube for both line and drop wire)
*Ground Rods and Ground Clamps (on ⅝" x 5' rods)

(Turn page, please)

SPIN Your Cable

- No more ring cuts—no more slack between cable and strand — reduce wind whip by 95%.
- One man can operate THIS spinning machine—simple to use and cable will stay permanently in place.
- Saves on first cost and cuts maintenance to the bone. Aerial cable plant lasts longer and looks better.

Don't Delay—Write TODAY

Full Particulars—No Obligation

Neale Manufacturing Co.

Crane and Topeka Ave.—Topeka, Kans.

The TEST of SERVICE is the test that counts

DRIERITE

for

CABLE SPLICING

For Five Years Serving the Telephone Industry

by the positive absorption of all moisture from wires, insulation, bandage and surface inside the sleeve. Easily and rapidly applied. Eliminates all danger of fire, accident or discomfort to workmen or occupants of buildings.

STANDARD PACKAGES

⅛ Pint Can (50 grams) 48 per Carton.
½ Pint Can (200 grams) 12 per Carton.
1 Quart Can (800 grams) 12 per Carton.

For sale by the Manufacturer and leading telephone supply houses.

W. A. HAMMOND DRIERITE COMPANY
Yellow Springs, Ohio

Miscellaneous Material

*No. 6 dry cells for L. B. Telephones
*Tape—rubber and friction
*Wood screws for equipment mounting
*Cable rings for new work and replacement.

EXAMINATION No. 2
CONSTRUCTION TOOLS, TRUCKS, and MATERIAL

Question

1. What are the three types and sizes of pliers most useful to a lineman.
2. In addition to pliers what other hand tools should the lineman carry in his tool belt?
3. List the tools required for digging and pole erection work.
4. What special tools are required for the cable splicers kit?
5. How should tools be "sent up" to the man working on a pole?
6. Why is an ordinary open box pick up truck not suitable for telephone maintenance and construction work?
7. What type of connection should be made at junction of open wire and drop wire?
8. What are the dimensions of a 10 pair cross arm for use on light toll or farm leads?
9. Is the ordinary 1¼" x 8" locust pin suitable for two piece transposition glass?
10. What is the purpose of a span clamp?

Announcement . . .

The GRAY MANUFACTURING COMPANY is now prepared to furnish GRAY TELEPHONE PAY STATIONS completely equipped with the *telephone instruments* and *dials* handled by any of our six agents listed below.

Our additional charge for *factory equipping and testing* on manual sets is 50c . . . and on dial sets $1.00 per station.

See one of our Agents now for further details.

AUTHORIZED AGENTS:

American Automatic Electric Sales Co.
Graybar Electric Company
Kellogg Switchboard & Supply Company
Leich Sales Corporation
The North Electric Mfg. Company
Stromberg-Carlson Telephone Manufacturing Company

the GRAY MFG. CO.

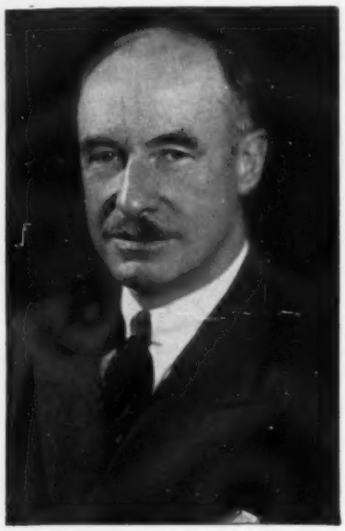
A New Acoustic All Steel Telephone Booth

SEVERAL improvements have been made in the already popular steel telephone booth introduced a few years ago by the **Sherron Metallic Corporation of Brooklyn, New York.** The new improved type of booth is equipped with walls and ceilings which are covered with perforated metal lining and are backed by a suitable acoustic sound-absorbing material. This greatly reduces the interference caused by the exterior noises and makes the new booth well adapted to installations where noise is objectionable or where privacy of conversation is desired. External sound entering the booth passes through the thousands of small holes in the metal lining and is readily absorbed by the acoustic material. Other features of the latest model are the equal-leaf folding door with its smooth action and fine appearance, an adjustable shelf and telephone instrument backboard unit which slides in a tubular standard of an improved design and through which the telephone wires pass to the top of the booth, a new steel seat of improved design covered with rubber which matches the floor tile and which is readily installed or removed without drilling holes in the booth, and a specially designed light located in the ceiling and which throws full illumination on the telephone instrument and yet is recessed so as to provide maximum head room in the booth. A compact electric ventilating unit provides adequate fresh air, yet is concealed so as not to detract from the appearance of the ceiling. The tile floor presents an excellent appearance and is easily cleaned. The booths are finished in high grade baked enamel and are available in single or a combination of colors to harmonize with the surroundings. For complete information and prices apply to the **Sherron Metallic Corp.,** 1201 Flushing Ave., Brooklyn, N. Y., manufacturers of this new and improved type of acoustic booth.

IF you see equipment you need and do not know the manufacturer, write the Editor.

KELLOGG ANNUAL REPORT

IN SENDING the Annual Statement to stockholders of the Kellogg Switchboard and Supply Company, Mr. Maurice K. McGrath, President, submitted the following report of the conditions and activities of the Company for the fiscal year ending December 31, 1940:



M. K. McGrath

"The earnings for the year ended December 31, 1940, amounted to $303,241.24 after providing for depreciation and federal income taxes and represents an earning of 95c on each share of common stock outstanding. This compares with earnings of $218,061.17 or 61c per common share for the year ended December 31, 1939. Dividends in the amount of 75c a share were paid on the common stock during 1940 as compared with 45c a share paid in 1939.

"A Net amount of $52,820.49 was added to the earned surplus account after the payment of dividends."

The company's balance sheet shows total current assets of $2,967,931.24; current liabilities of $407,929.84, and total assets of $4,636,754.81. This total consists of cash, $944,915.01; United States, municipal and other bonds plus accrued interest (less reserve), $215,676.25; notes and other accounts receivable, $583,848.01; inventories of finished parts and goods, work in process, raw materials and supplies (less reserve), $1,223,491.97.

Geo. R. Eaton

In paying respects to the years of service of Kellogg employees, Mr. McGrath stated that the Kellogg Company will be forty-four years old on April 28th of this year. It has built up an organization of employees whose efficiency is a large factor in the successful operation of the business. Due to the increase in its business since the depression years, younger employees have been added to its staff and it is hoped that these will in turn, become veterans in its service.

James H. Kellogg

It is the Company's aim to maintain continuity of employment for its staff, to build up a high standard of personnel, to pay salaries and wages commensurate with the service rendered and earnings of the company, and to provide safe and healthful working conditions.

The company is appreciative of its relations with its customers, Mr. McGrath stated, many of whom it has had the privilege of serving since the early days of the Independent Telephone Industry.

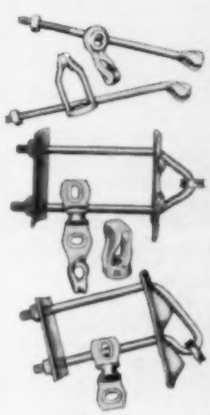
Albert Parlett, Jr.

Officers and management personnel of the Kellogg company is as follows: M. K. McGrath, president; James G. Kellogg, vice-president and assistant secretary; Geo. R. Eaton, vice-president in charge of engineering; Louis B. Sauer, vice-president in charge of manufacturing; Harry C. McCluskey, treasurer; James H. Kellogg, secretary; Eddis Johnson, assistant treasurer and assistant secretary; Claude D. Manning, executive assistant to the president; Albert Parlett, Jr., sales manager and Ray C. Krueger, advertising manager.

Ray C. Krueger

"This is a cinch! Half the job is done on the ground . . .

. . with THIMBLEYE guying fixtures."



Guy attachment is much simpler and easier when Chance Thimbleye guy fixtures are used. Guys may be made up on the ground ready to mount on the pole. Attaching the guy to the pole is then much quicker and easier than the old wrap around method. The hazard of loose flying ends of cable is eliminated and several feet of strand are saved on each installation.

GET FULL GUY STRENGTH

The Chance drop-forged Thimbleye permits guy strand to be pulled through or wrapped around the thimbleye groove without kinking, bending or breaking. The strand retains its full cylindrical form and is not weakened by distorted or broken strands. Compare the smooth contour of the strand in the thimbleye with the unnatural bends and strand separations in the ordinary eye.

Thimbleye guy fixtures make it safer to depend on guy strand to carry its recommended load.

Chance Thimbleye guy fixtures may be used individually or in a variety of combinations.

Manufactured and distributed by these licensees—

Hubbard and Company.....Pittsburgh, Pa.
Joslyn Mfg. & Supply Co.....Chicago, Ill.
Line Material Co.....Milwaukee, Wis.
Oliver Iron & Steel Co.....Pittsburgh, Pa.
Kortick Mfg. Co.....San Francisco, Cal.
Seyler Mfg. Co.....Pittsburgh, Pa.
Copperweld Steel Co.....Glassport, Pa.
Utilities Service Co.....Allentown, Pa.
Electrical Mfg. Co.....Battle Creek, Mich.

A·B·CHANCE CO. CENTRALIA MISSOURI

The Clearing House

For the convenience of readers of Telephone Engineer

LOOMIS ADVERTISING CO.

A SALES ORGANIZATION *Exclusively..*

That Has Never Failed to Produce More Net Revenue (All Costs Considered) for Telephone Companies Served.

IF INTERESTED in more net telephone directory revenue write or call at our expense.

LOOMIS ADVERTISING CO.

Telephone Bldg., Kansas City, Mo.

Citizens Trust Bldg., Fort Wayne, Ind.

135 So. Second St., Philadelphia, Pa.

Reconditioned COMBINED DROPS AND JACKS

KELLOGG-STROMBERG
W. E. CO. - LEICH
DEAN - MONARCH
AMERICAN - NORTH

Parts

COILS - JACKS - SLEEVES

Save 40%

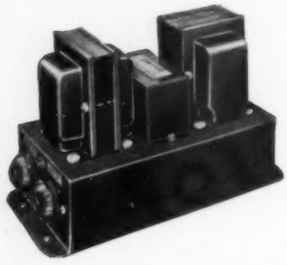
Buckeye Telephone & Supply Company

COLUMBUS, OHIO

New "Baby" SUB-CYCLE

The Lorain Products Corporation of Lorain, Ohio, has developed a "Baby" SUB-CYCLE Ringing Converter known as the Model M-7.5. This new machine was designed for lighter ringing loads than may be handled by the Model "S" SUB-CYCLE.

This new light-duty model has a rated output of 7½ watts, 90 volts, 20 cycles, when operated on a 60 cycle input.



The new unit is self-contained and does not have any exposed terminals or leads. The unit comes equipped with plug connections for both input and output so that the unit may be readily connected or disconnected. The "Baby" was brought out in response to numerous requests for a smaller and lower priced SUB-CYCLE which could be used with small cordless switchboards, PBX's, and even some small central offices.

The size of the new machine is 11"x5"x6¾".

FLASH!

Following its past trends of telephone industry decisions upholding the independent unions in that field, the National Labor Relations Board April 8 ordered dismissal of an unfair labor practice complaint against the Lincoln, Nebr., Telephone and Telegraph Co.

THE NEW ELECTROX

Battery Eliminator Type PA-05004

$16.85

Complete with power-off relay. Output for two operators' sets. Mount; connect two leads to operator's terminal; plug in cord. Presto! no more battery problems! Sent on trial. Write for Cir. 373.

ELECTROX A Schauer Product 2060-68 Reading Road CINCINNATI, OHIO

Telephone Engineers

J. G. WRAY & CO.
Telephone Engineers

Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
105 West Adams Street
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J. W. WOPAT
CONSULTING ENGINEER

Telephone Engineering — Construction Supervision — Appraisals — Financial — Rate Investigations
1510 Lincoln Bank Tower
Fort Wayne, Indiana

Cedar Poles

Carney

CEDAR POLES

Plain or Butt Treated
B. J. CARNEY & CO.
100 No. 7th St. Minneapolis

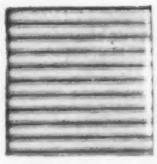
Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

Telephone Directories

Telephone Directory
ADVERTISING
Write or telephone for proposition
L.M.BERRY & CO.
Call L.D. 16, Telephone Bldg., Dayton, O.

CABLE-SPLICERS WIPING CLOTHS

Formed-flexible finishing cloths (Patented); Flat finishing cloths; Catch cloths; Crotch cloths and Up-right joint catch cloths. Made of world-prize HERRINGBONE TICKING or imported English MOLESKIN. Write us for literature and prices from your jobber or from us.



GEO. E. WILLIAMS, *Mfr.*
3035 ALDRICH AVENUE, MINNEAPOLIS, MINN.

The Clearing House

For the convenience of readers of Telephone Engineer

QUALITY CORDS

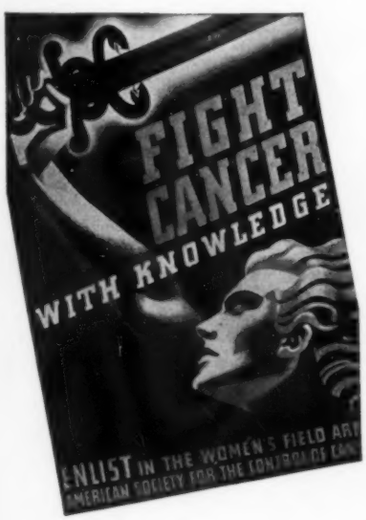
WHEN YOU NEED CORDS BUY QUALITY CORDS

Commercial cords are high quality cords, because they are made using the best materials and with expert workmanship.

Our standard are now waterproofed and moisture-proofed with no increase of prices.

"QUALITY CORDS"

Commercial Cord
AND SUPPLY COMPANY
CLIFTON SPRINGS, N. Y.



Early diagnosis is the first line of defense against cancer. Enlist in the local unit of the Women's Field Army. Annual enlistment fee $1.00.

AMERICAN SOCIETY
for the
CONTROL OF CANCER
350 madison avenue • new york city

A New Scientific Anchor Locator

Sinking a corner anchor hole in the ground is regarded by most telephone crew men as a pretty exacting operation. Too often they have learned that an incorrectly anchored corner pole can plunge an entire lead of poles to the ground even in an ordinary storm.

The expense and delay resulting from such an occurrence is familiar to most everyone; yet up until the present time there has been no way of knowing whether or not corner anchors were being set at the exact angle required for perfect bisection of the lines of force.

A new instrument just introduced by W. C. Dillon & Company, Inc., Chicago, appears to be just what the industry has long needed to solve the old problem of correctly sinking corner anchor poles. This scientific tool, known as the Dillon Bisector, is extremely compact and light. In actual test it has been used by a crew man who never saw the instrument before in his life yet who accurately located the correct position for a corner anchor in less than 60 seconds of time.

The Dillon Bisector is an extremely rugged tool measuring 13 inches long. It folds up into a compact unit only ¾ of an inch wide. Its use requires no charts, no figuring, no measuring.

WANTED to purchase, lease, rent and operate, telephone exchange with 100 to 200 stations. Prefer New England, will consider any location. Address: W. H. Weppler, 346 Spring Street, Athol, Mass.

FOR SALE: Western Electric 160 line magneto switchboard. Southeast Arkansas Telephone & Power Co., West Memphis, Ark.

POSITION WANTED

Graduate Electrical Engineer, 15 years experience, engineering and supervision of construction and maintenance of local battery, common battery and automatic telephone plants of Electric Railroads. At present employed as telephone engineer but desire a change. References. Box 8264, TELEPHONE ENGINEER.

Telephone Repair Co.

Specialists in Repairing and Rebuilding Transmitters

Repair service for Transmitters, Receivers, Desk Stands and Wall Phones—Magneto or Common Battery.

Auto-Elec. Co. 80 Line Floor Type 24 Volt PBX — 10 Pairs of Cords.....$350.00

Reliable Electric 200 Line Main Frame—Complete..$ 80.00

Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

Something New

No. 14 Type Terminal Repair Kit

A method has been developed for repairing No. 14 Type Terminals when the binding post is broken back of the face plate. The average time of repairing one post is five minutes.

The Repair Kits with instructions sell for $1.85.

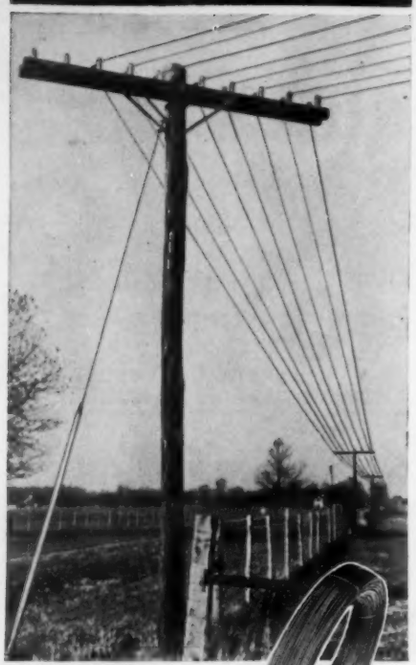
Channell Splicing Machine
2415 Roanoke Rd.
San Marino, California

Reconstructed Equipment

Western Elec. No. B No. 52, E No. 1805 E No. 484, E No. 829, E No. 6438 or E No. 370 Relays @	$ .75
Mounting strips for the above @	.75
Western Elec. No. 323 Transmitters with mouthpiece less back @	1.00
Kellogg No. 729 Central Battery Oak Finish hotel sets with Straight line ringer and Booster Coils @	6.75
Western Elec. No. 20 Central Batt. Ind. Coil 35c ea. No. 46 @	.50
Western Elec. No. 50 3-bar Hand Generators with Crank & Mtg. Screws @	2.75
Kellogg No. 75 Steel 1000 ohm ringer extension bells @	2.50
Western Elec. No. 20 Desk set with Connecticut Combination Central Batt. and magneto signal set with 3-bar Gen. and 1000 ohm ringer @	9.00
Leich Elec. Transmitters with back and Mounthpieces @	.90
Kellogg No. 2800 type 4-bar 1000 or 1600 ohm Bdg. compacts (Pony type) @	9.25
Double pole double throw 15 Amp Knife switches @	.25
Kellogg No. 41 or Western Elec. No. 143 Receivers with Cord @	1.25
Western Elec. No. 71C, No. 75a or No. 73A Retard Coils @	2.00

REBUILT ELECTRIC EQUIPMENT CO.
1934 WEST 21st STREET
Pilsen Station
CHICAGO, ILL.

Crapo
HIGH-TENSILE
LOW-RESISTANCE
LINE WIRE



300-foot Spans of *Crapo* HTL-135 Line Wire in Heavy Loading District

LONGER SPANS
STRONGER SPANS

TELEPHONE companies throughout the country are cutting construction costs, reducing maintenance expense, improving service on rural lines by using *Crapo* HTL-85 and *Crapo* HTL-135 High-Tensile, Low-Resistance Line Wires.

Crapo HTL-85 permits spans of 225 feet in heavy loading to 375 feet in light loading districts. *Crapo* HTL-135 makes possible spans of 350 feet in heavy loading to 500 feet in light loading districts.

Complete technical data and construction practice information will be forwarded on request. Ask for Bulletins No. 201 and No. 202!

For Long Spans

For Extra Long Spans

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

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